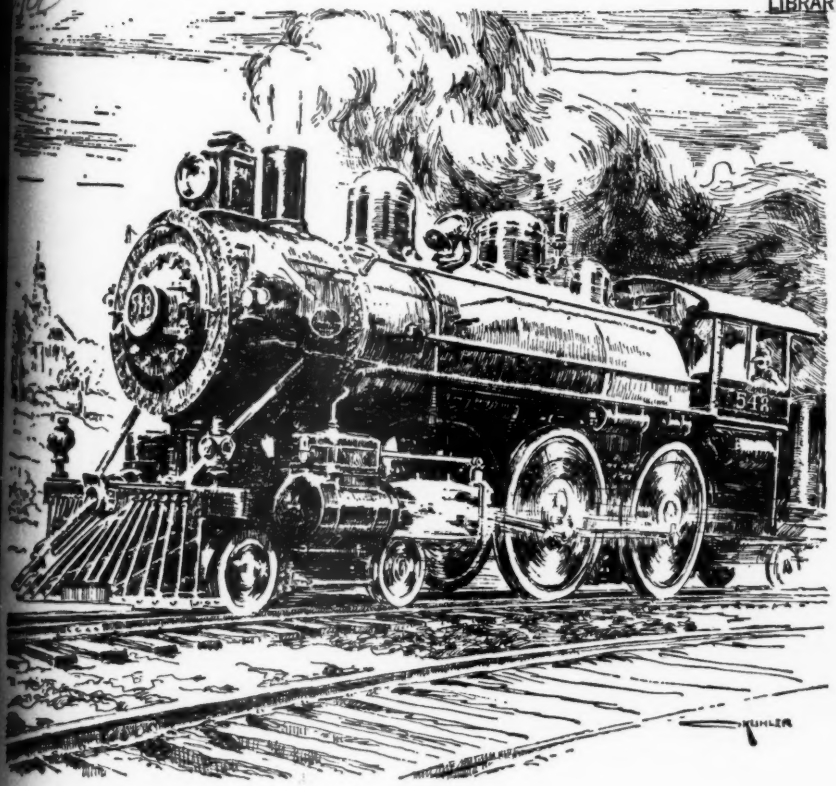
The Railway and Locomotive Historical Society

BULLETIN No. 100



THE RAILWAY AND LOCOMOTIVE HISTORICAL SOCIETY

APRIL 1959

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The

Railway and Locomotive Historical Society,

Inc.

It was in the spring of 1921, thirty-eight years ago, that this Society published its first Bulletin, containing three articles with a total of 32 pages. To those that contributed to this first publication came the hopes and ambitions that more would follow. Only one of the three original contributors is alive today to see the publication of our 100th numbered Bulletin for there have been ten publications printed without numbers. It has been the hope of your Editor who has acted in that capacity all of these years that there has been a steady improvement and that they have been of genuine interest and value. And, in passing, I want to thank the many contributors, who by means of their research and patience have helped make this publication possible. We are also indebted to the late John W. Stowell whose friendly advice and aid in the matter of printing, came at a time when it was most needed.

In this publication we welcome a newcomer to these pages—Mr. Joseph F. Webber with his paper on the Goldfield Railroads. The balance of the authors need no introduction—Messrs. Paul T. Warner,

Frederick Westing, F. Stewart Graham, C. C. Edmiston, C. F. H. Allen and your Editor—all have tried to present something of interest and we have tried to be liberal with our illustrations.

In the summer of 1902, the Rhode Island Works of the American Locomotive Co., delivered ten handsome eight wheel passenger engines to the New Haven R. R., numbered 541-550. They were delivered to the road at Providence, R. I. and then run light to Boston to be "broken in." Not long ago the late A. A. Gilmore sent your Editor a beautiful print of the No. 548 taken on a siding at Sharon Heights, Mass., being run light for Boston—a brand new engine about to start a busy life on the head of Shore Line passenger trains and then relegated to others of less importance. Otto Kuhler, our artist, has placed the No. 548 in actual service passing Sharon Heights and we are indebted to him for his sketch of this beautiful locomotive and we hope it will appeal to our members.

Mogul Type Locomotives

By Paul T. Warner

During the period from 1870 to the close of the Century, the greater part of the road work on American railroads was done by four types of locomotives—the American (4-4-0), Ten-wheeled (4-6-0), Mogul (2-6-0) and Consolidation (2-8-0). The first was primarily a passenger engine, although it was extensively used in freight service also; the second was used chiefly for freight, but also, to a limited extent, for passenger service; while the Mogul and Consolidation types were definitely freight engines, although occasionally used in passenger service.

Articles already published in the Bulletin have covered the history of the American and Ten-wheeled types. It is the purpose of the present article to discuss the history of the Mogul type, while the Consolidation will be covered in a later article. While the Mogul type has probably attracted less attention than the other three, it has played an important part in American railroad history and has been built, in considerable numbers, for export, especially to colonial countries.

PREDECESSORS OF THE MOGUL

It was in the early 1860's that the Mogul became a fully-developed design, first built by the Rogers Locomotive Works of Paterson, New Jersey. Previous to that time, various designs of six-coupled locomotives, apart from Ten-wheelers (4-6-0 type) were in use, but they were not Moguls. Among the best known were the "flexible beam truck" locomotives (0-6-0 type) patented by Matthias W. Baldwin in 1842, and built by the Baldwin Locomotive Works. With the first and second pairs of wheels held in place by vibrating beams so that they could move laterally across the track, those locomotives could traverse sharp curves, and with all the weight on drivers could haul maximum loads in proportion to their weight. They maintained their popularity until the early 1850's, when the 4-6-0 type began to supersede them. About the same time, in 1852, James Millholland brought out his "Pawnee" class on the Philadelphia & Reading—a six-coupled locomotive with a single pair of leading wheels held in the main frames, and placed between the cylinders and the first pair of driving wheels. A sectional drawing of one of these locomotives, dated 1855, shows plain tires on the first and second pairs of drivers, the engine thus being held on the track by the leading wheels and the rear drivers. The valve motion was of the Gooch type, with a suspended link operated by two eccentrics, and a radius rod transmitting the motion to the valve rod. Most novel of all, perhaps, was the boiler, which had Millhollands intermediate combustion chamber, as patented by him. The late Angus Sinclair in his book, *Development of the Locomotive Engine*, says of the Pawnee class:—

> "In their time these engines were reputed to be the finest locomotives ever built, so far as finely proportioned machinery was concerned, but they had the fault of many other fine engines; they were very poor steamers."

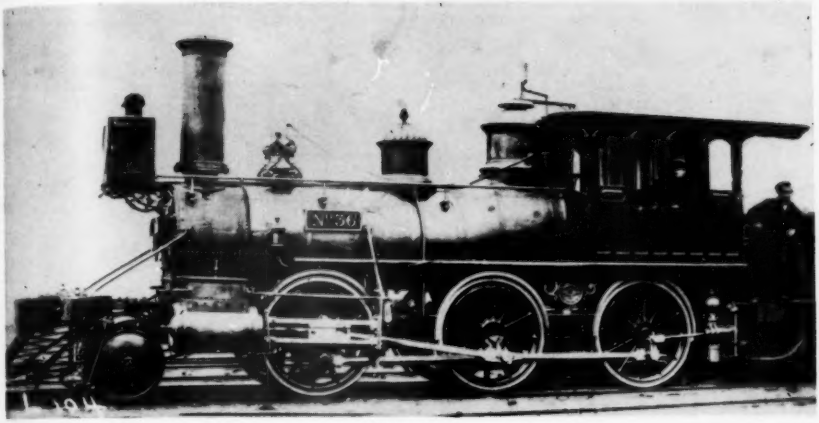
Locomotives with the same wheel arrangement as Millholland's "Pawnee" class were built to a limited extent for other roads. The Pennsylvania, at least, had a group of 12, built by Smith and Perkins of Alexandria, Virginia. They had 17x22-inch cylinders and driving wheels 44 inches in diameter. Two additional locomotives of the same general design were built for the road by the Norris Locomotive Works of Philadelphia, and there were probably other cases of which the writer has no record. In 1852 the Pennsylvania received, from the Baldwin Locomotive Works, six locomotives of the 2-6-0 type, in which the cylinders were inclined and were placed immediately above the leading wheels. Whether the leading axle had any lateral or rotating movement, the writer does not know. It was found that the weight carried by this single pair of wheels was too great, and a four-wheeled truck was therefore substituted.

In the meantime, an interesting development had taken place in Russia. In 1844, Messrs. Eastwick and Harrison, who had been building locomotives in Philadelphia and making a name for themselves on account of their advanced designs, closed their plant and, under the name of Harrison, Winans and Eastwick, began building locomotives in St. Petersburg for the Imperial Government Railways. Included in their designs was a 2-6-0, an illustration of which appears in Bulletin No. 47; and line drawings of this same engine are shown in the book *Development of the Locomotive Engine*, by Angus Sinclair, and also in the book *The Locomotive and Philadelphia's Share in its Early Improvements*, by Joseph Harrison, Jr. (1872). The engine is stated to have been built as early as 1844,* but the drawing apparently was made later. It shows what appears to be a radial leading truck, but the details are not clear and the method of transferring the load to the truck cannot be determined. If Millholland knew of this design, he apparently was not influenced by it when he built his *Pawnee* Class in 1852. The drawing of the Russian engine is most interesting, and it is unfortunate that we have so few details of its construction.

The next step anticipating the true Mogul appears to have been taken in 1860, when the Baldwin Works built four 2-6-0 type locomotives for the Louisville & Nashville. This design suggested a Ten-wheeler (4-6-0) with the rear truck wheels omitted; the leading drivers being well back from the cylinders. The front truck was of the Bissell type with a long radius bar, and inclined slides forming a centering device. An old drawing shows plain tires on the leading drivers. The boiler, 46 inches in diameter, had a deep firebox with a long combustion chamber, and was fed by two Giffard injectors; no pumps being used. These were large locomotives for their day, as they had 18½x22-inch cylinders and 52-inch driving wheels. The weight on drivers was 54,000 pounds, and the total weight about 65,000 pounds. At least two of similar design were built by Baldwin for the Dom Pedro Segundo Ry. of Brazil (5′ 3″ gauge).

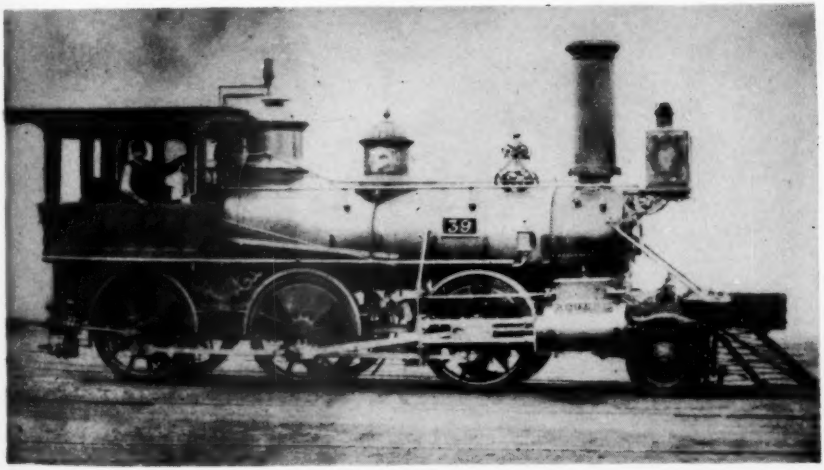
On May 10, 1864, William S. Hudson, Superintendent of the Rogers Locomotive Works of Paterson, N. J., was granted Patent No. 42,662,

* Pennoyer in Bulletin 47.



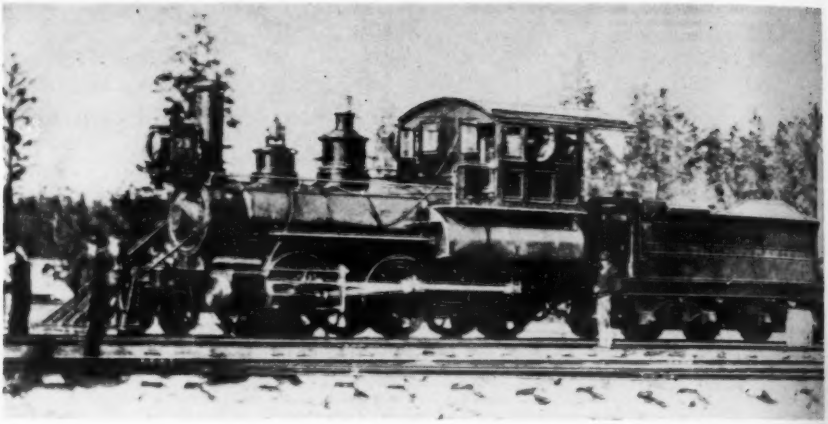
Courtesy of W. A. Lucas

N. J. R. R. & T. Co. #36. Rogers #1107, 11/1863. Shown with Hudson's stack. 17x22" 54" 73300.



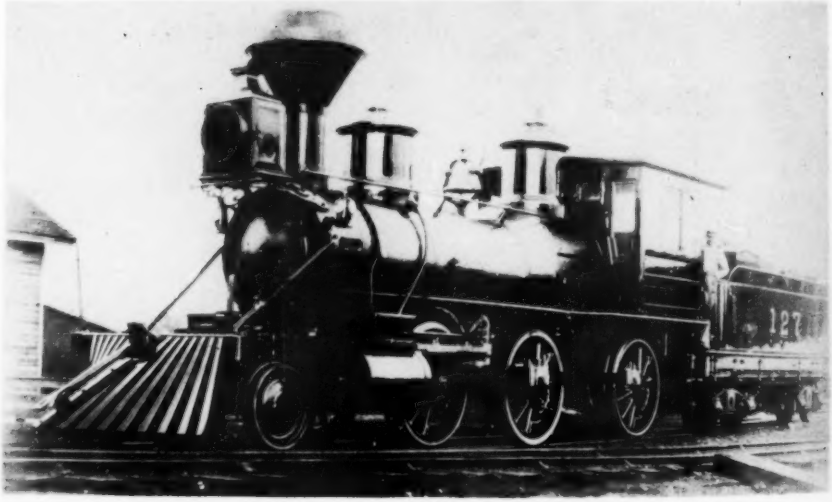
Courtesy of W. A. Lucas

N. J. R. R. & T. Co. #39, Rogers #1227, 1/1865. Shown with Hudson's stack. 17x22" 54" 73300.



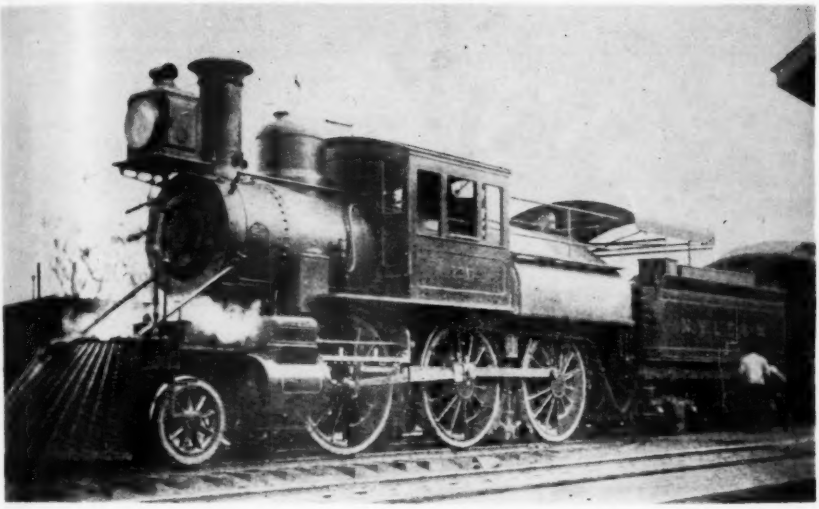
Courtesy of W. A. Lucas

North Pennsylvania #73, Baldwin #5637, 1881. 18x24" 54" 78000.



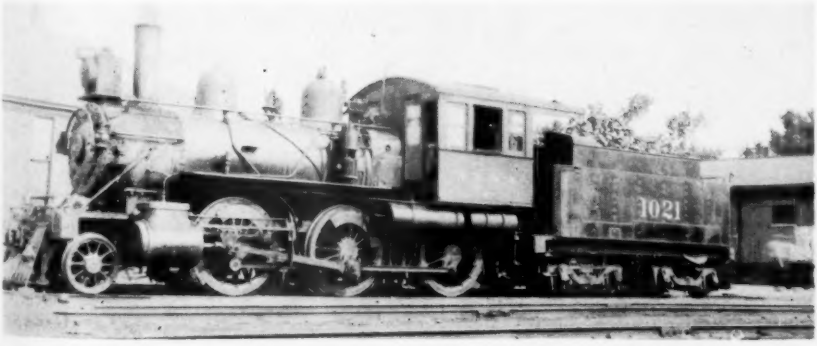
Courtesy of C. E. Fisher

L & N #127, Rogers, 1881. 20x24" 55" 108000.



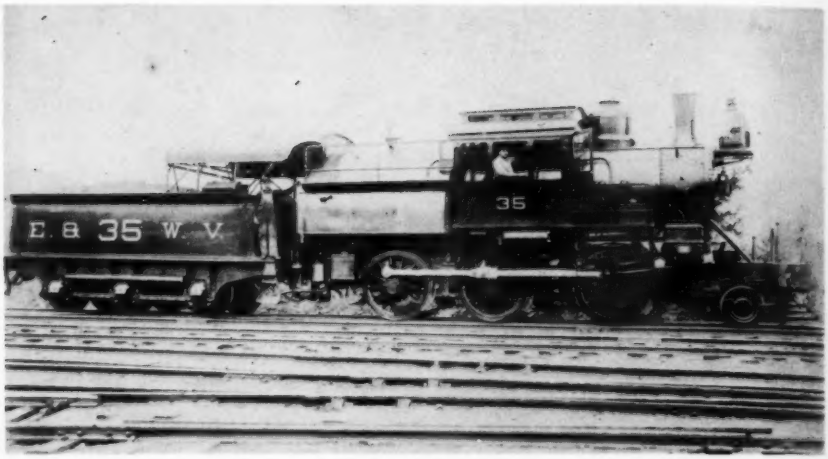
Courtesy of W. A. Lucas

N. Y. L. E. & W. #136, Baldwin #8082, 1886. Built for Passenger Service.



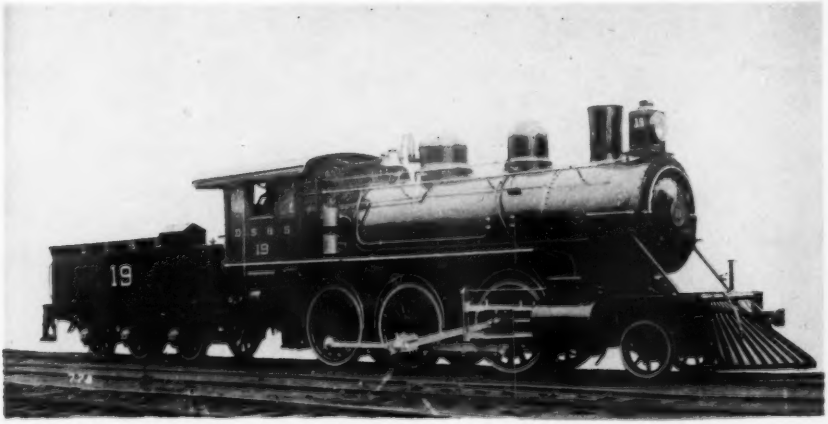
Courtesy of C. E. Fisher—O. H. Means

C. B. & Q. #1021 at Savanna, Ill. Rhode Island, 1889, H-1. 19x24" 64" 110000.



Courtesy of W. A. Lucas

Erie & Wyoming Valley #35, Baldwin #14067, 1894. (3)17x24" 57" 110100# on drivers.



Delaware, Susquehanna & Schuylkill R. R. #19. Baldwin #13980, 3/1894. 22x28" 62".

covering a method of equalizing the leading drivers with a forward two-wheeled truck. This patent was discussed in the article "Some Early Locomotive Patents" by the present writer, which was published in *Bulletin No. 87*. The equalizer was a heavy beam, placed on the center line of the locomotive and fulcrumed under the smokebox or cylinder saddle. The springs over the boxes of the first driving axle were connected by a transverse beam, which was in turn connected, at its middle point, to the rear end of the forward beam. The remaining drivers were equalized on each side, in the usual manner. In this way a three-point suspension was secured, and the danger of throwing an excessive load on the leading truck, when passing over uneven track, was avoided.

During the period that the Hudson patent was coming through the mill, Rogers built three locomotives of the 2-6-0 type for the New Jersey R. R. & Transportation Co. Two of these, numbered 35 and 36, were ordered on March 24, 1863 and completed in October of that year; while the third, numbered 39, was ordered on February 4, 1864, and completed in January, 1865. The specification covering engine 39 stated that it was to be "similar in all respects with the 35 and 36." Photographs, however, show a slight difference in the forward truck, and the writer is inclined to believe that the 39 was the first true Mogul with the leading truck and forward drivers equalized. The New Jersey locomotives were hard-coal burners of medium size, with 17x22-inch cylinders and 54-inch driving wheels. They were built for a gauge of 4′ 10″.

EARLY MOGULS

A new type of locomotive for freight service was now definitely established, and was soon to become prominent on many railroads. The Baldwin Locomotive Works built their first true Mogul in 1867; it was of moderate dimensions, and was built for the Thomas Iron Company, located in eastern Pennsylvania, and bore the name "E. A. Douglas." In the first edition of the History of the Baldwin Locomotive Works, which was included in a catalog published in 1872, the "Douglas" is specially mentioned, and the following statement is made:—

> "Several sizes of 'Moguls' have been built, but principally with cylinders 16, 17 and 18 inches in diameter, respectively, and 22 or 24 inches stroke, and with drivers from 54 to 57 inches in diameter. This plan of engine has rapidly grown in favor for freight service on heavy grades or where maximum loads are to be moved, and has been adopted by several leading lines. Utilizing, as it does, nearly the entire weight of the engine for adhesion, the main and back pairs of drivers being equalized together, as also the front drivers and the pony-wheels, and the construction of the engine with swing-truck and one pair of drivers without flanges allowing it to pass short curves without difficulty, the 'Mogul' is generally accepted as a type of engine especially adapted to the economical working of heavy freight traffic."

Just when the name "Mogul" was first applied to the 2-6-0 type, or who first used it, the writer does not know. It was probably adopted

on account of the increased hauling capacity of the 2-6-0 as compared to the American, or 4-4-0 type, for with the same weight on each pair of drivers, the 2-6-0 could develop 50% greater tractive force.

As an illustration of a Mogul, the Baldwin catalog of 1872 showed a handsome engine named "Franklin," road number 33, built for the New York Midland Railroad. A generally similar locomotive was illustrated, by some excellent wood cuts, in the *Railroad Gazette* of February 17, 1872 and also in the volume *Recent Locomotives*, published in 1882. These illustrations clearly bring out the characteristic features of the soft coal or wood burning Mogul as built at that time, viz:—a deep firebox placed between the second (main) and rear driving axles; ample space between the first and second driving axles to accommodate a well-designed Stephenson link motion, with all the parts readily accessible; guides spanning the first pair of drivers, and connected, at their rear ends, by a substantial transverse yoke extending across the engine; and the three-point suspension system for the frame, with the leading truck and first pair of drivers equalized together. The result was a locomotive admirably fitted for handling all but the heaviest freight traffic of that period.

EXHIBITION LOCOMOTIVES

The exhibit of locomotives at the Centennial Exhibition, held in Philadelphia, in 1876, included two Moguls which are worthy of mention. One, built by the Baldwin Locomotive Works, was for the Dom Pedro Segundo Ry. of Brazil, whose track gauge was 5′ 3″. Except for certain specialties such as buffers and couplers, and a copper firebox, the design conformed to American practice. The boiler was 51 inches in diameter at the first ring, and had a straight top, with the dome forward of the firebox. The cylinder dimensions were 18″x24″, and the drivers were 54″ in diameter. With a steam pressure of 130 pounds, which was probably carried, this gave a tractive force of approximately 16,000 pounds, with 68,000 pounds on drivers (ratio of adhesion, 4.25). The total weight in working order was 80,000 pounds. This locomotive was evidently highly regarded by the builders, as an illustration of it appears in the 1881 edition of the Baldwin catalog.

The second Mogul exhibited at the Centennial, to which previous reference has been made, was the famous No. 600 of the Baltimore & Ohio R. R., designed in 1875 by J. C. Davis, then Master of Machinery, and built in the Company's shops at Mt. Clare. The 600 was intended for through passenger service between Keyser and Grafton, West Virginia, in the Allegheny Mountains, which included the famous 17-mile grade of 116 feet per mile. A feature of the design was the location of the firebox, which was placed between the frames but above the rear driving axle, thus obtaining more grate area than could be provided with the conventional deep firebox. The leading particulars of the locomotives were as follows:—

Weight in working order	90,400 lbs.
Weight on driving wheels	76,550 lbs.
Cylinders	19″x26″

Driving wheels, diam.	60″
Boiler, diam. (front ring)	50″
Firebox	90-7/16″x34-5/8″
Grate area	23.7 sq. ft.
Total heating surface	1272 sq. ft.

Assuming a steam pressure of 130 pounds, the tractive force was 17,300 pounds, giving a ratio of adhesion of 4.43.

An article describing this locomotive, together with an excellent shaded elevation drawing, was published in the *Railroad Gazette* of November 17, 1876, and also in the volume *Recent Locomotives*. The consist of a typical passenger train hauled over the 17-mile grade, was given as follows:—

1 baggage car	44,800 lbs.
1 postal car	45,950 lbs.
2 passenger cars (60 seats each)	84,800 lbs.
1 Pullman car	59,450 lbs.
Total	235,000 lbs.

All cars had six-wheel trucks.

The schedule time up the 17-mile grade, with such a train, was 65 minutes, or 50 minutes when using a helper engine with six cars.

No. 600 was not a decided success in passenger service, and was soon assigned to hauling freight; and was followed, in freight work, by other Moguls of similar design. The old engine has been carefully preserved, and has been much in the public eye; as it was exhibited in Philadelphia in 1876, and at Chicago in 1893, St. Louis in 1940, the Sesqui-Centennial in Philadelphia 1926, and at the New York World's Fair in 1939-1940; truly, quite a publicity record.

HEAVIER LOCOMOTIVES

In the meantime, the Mogul type had been making steady progress. In 1881, the Rogers Works at Paterson, New Jersey, built a group of Moguls for the Louisville & Nashville which were rightly considered large engines at that time. As later fitted with air brakes and other improvements, they weighed 108,000 pounds, with 90,000 pounds on drivers; and developed a tractive force of 22,200 pounds with a steam pressure of 155 pounds. They had 20x24-inch cylinders and 55-inch drivers; the grate area was 17 square feet and the total heating surface 1270 square feet. In weight and hauling capacity they were comparable to the Consolidation (2-8-0) type as usually built at that time.

In May and June, 1881, Baldwin built a group of six Moguls (road numbers 72-77) for the Northern Pacific, which were notable because they were designed to burn lignite, and were fitted with Wootten boilers having grates 8 feet wide. They were medium-sized engines, with 18x24-inch cylinders and driving wheels 54 inches in diameter. The total weight was 78,000 pounds, with 66,000 pounds on drivers. As liberal clearance limits were specified, it was possible to place the cab at the

rear, on top of the firebox; the result being a most ungainly looking locomotive. The writer has no information as to the service record of the Wootten boilers, but they were probably eventually replaced by soft-coal burning boilers of conventional design.

In July, 1886, Baldwin built, for the New York, Lake Erie & Western R. R., two passenger Moguls with Wootten boilers and 68-inch driving wheels. They had 20x24-inch cylinders and weighed 118,700 pounds, with 101,000 pounds on drivers. The cab was placed over the boiler barrel, ahead of the firebox, so that the locomotives were true "Mother Hubbards." A feature of the boiler design was the location of the dome, which was placed immediately back of the front tube sheet, and ahead of the cab. A brake of the cam type was applied to the main and rear pairs of driving wheels, with vertical cylinders. Sand was carried in two boxes, placed right and left at the front end of the running boards.

These locomotives were subsequently extensively rebuilt. They were given new boilers and 62-inch driving wheels, and the piston stroke was increased to 26 inches. They were then placed in freight service.

PASSENGER MOGULS ON THE BURLINGTON

In 1888, the Chicago, Burlington & Quincy adopted the Mogul for heavy passenger service, as the American (4-4-0) type locomotives used up to that time were proving inadequate for the work to be done. The new locomotives had 18x24-inch cylinders and driving wheels either 62 or 68 inches in diameter, the smaller size being usually used in freight service. These engines had Belpaire fireboxes, placed above the frames. A group built by the Baldwin Locomotive Works in 1890 (eight for passenger service and two for freight) carried a steam pressure of 155 pounds, and weighed 125,000 pounds total, with 106,500 pounds on drivers. In 1892, tests were run between Chicago and Galesburg, 162.5 miles, using two single expansion Moguls with wheels respectively 62 and 68 inches in diameter, a compound Mogul with 62-inch wheels, a new design of 4-4-0 with 18x24-inch cylinders, and a Baldwin experimental 4-6-0 type locomotive with Vauclain compound cylinders (Compound No. 82). Passenger Train No. 1, at that time, was scheduled to run from Chicago to Galesburg in 4 hours, 2 minutes, and with a maximum of 12 cars, weighed 400 tons behind the tender. The two single expansion Moguls did the best work on this run. With ten cars or less, the high wheeled engine was the more economical, but with more than ten cars, the engine with 62-inch wheels was superior.

That the Moguls had ample speed capacity was demonstrated on more than one occasion, especially when hauling comparatively light mail trains. Thus on April 30, 1900, eastbound Train No. 8 ran the 206 miles from Burlington to Chicago in 203 minutes; or, deducting time for stops, in 188½ minutes, at an average speed of 65.5 miles an hour. The 45.4 miles from Mendota to Chicago were run in 37 minutes, at an average of 73.6 miles an hour.

The passenger Mogul on the Burlington reached its culmination in Class H4, 15 of which were built by the Baldwin Locomotive Works in

1899. In this class, the driving wheel diameter was increased to 72 inches, the piston stroke to 26 inches, and the steam pressure to 200 pounds. This combination gave a rated tractive force of 22,200 pounds. The boiler had a Belpaire firebox placed above the frames, with a grate area of 30 square feet; and the total heating surface was 2040 square feet. These engines weighed 143,700 pounds, with 121,600 pounds on drivers. The slide valves had an inside clearance of ⅛-inch—a good feature for high speed.

By the turn of the century the Burlington was beginning to use Prairie (2-6-2) type locomotives in freight service and Atlantics (4-4-2 type) in fast passenger service, and Moguls were gradually being assigned to less important work.

Reverting now to 1893, it should be noted that while there was a large exhibit of locomotives at the World's Columbian Exposition held that year in Chicago, Moguls were few and far between. There were, however, two examples which deserve mention, built by the Brooks Locomotive Works and the Pittsburgh Locomotive Works respectively. The Brooks exhibit included five locomotives of different types for the Great Northern Ry. which, while differing considerably in size and design, showed a marked similarity in various details. The Mogul was a medium-size locomotive of its type, with 19x24-inch cylinders and driving wheels 55 inches in diameter. It had a straight-top boiler with a Belpaire firebox, which was placed between the frames and above the rear driving axle. The pressure carried was 180 pounds, and the total weight 118,000 pounds with 102,000 pounds on drivers. The Pittsburgh engine was of the two-cylinder or cross-compound type, and was built for the Columbus, Hocking Valley & Toledo Ry. It was a typical Pittsburgh engine in appearance, well proportioned and with a trim outline. The high and low-pressure cylinders were respectively 19 and 29 inches in diameter, the stroke being 26 inches; and the total weight was 116,200 pounds, or practically the same as that of the Great Northern locomotive previously mentioned.

COMPOUND LOCOMOTIVES

In the early nineties, compounding was beginning to attract the attention of American railroad managers, and all the various builders were prepared to furnish compound locomotives. The leader in pushing the compound was the Baldwin Locomotive Works, which built a four-cylinder engine designed under patents granted to Samuel M. Vauclain, who was then the Works' superintendent. The Vauclain compound had a high and a low-pressure cylinder on each side, placed one above the other, with the two pistons connected to the same crosshead. In the cross-compound, the high-pressure cylinder was on one side of the locomotive, and the low-pressure, of considerably larger diameter, on the other side. This resulted in a lack of symmetry in design, and of difficulty in getting the reciprocating parts on the two sides of the engine to be of approximately the same weight. The most difficult problem was to so design the engine that it could develop full starting power with the cranks in any position. Some means for getting steam into the

low-pressure cylinder at starting was essential, and was accomplished by various patented devices. In the Vauclain four-cylinder compound, the steam, at starting, by-passed the high-pressure cylinders, and practically all the work was done in the large low-pressure cylinders. The increased tractive force needed to start was developed, but the wear on guides, crossheads and piston rod packing was excessive, and steam leaks were a frequent trouble and a serious safety menace in operation.

Many compound Moguls of both the two and four-cylinder types were built up to about 1902, when the demand suddenly ceased. The railroads were soon busy changing their compounds back to single-expansion.

INTERESTING DESIGNS

In 1894, Baldwin built two groups of Moguls which are worthy of notice because of their size and special features. Ten engines were built for the Delaware, Susquehanna & Schuylkill R. R., located in the anthracite region of Pennsylvania, which served mines in the Hazleton and Beaver Meadow districts. At the time of their construction these were probably the heaviest Moguls in existence, as they weighed 152,000 pounds with 136,100 pounds on drivers. With 22x28-inch cylinders, 62-inch drivers, and a steam pressure of 160 pounds, the tractive force was 29,800 pounds. Lump anthracite was used for fuel; the boiler was straight, 72 inches in diameter, with a firebox 11 feet long placed above the frames, and having a grate area of 38 square feet. The total heating surface was 2084 square feet. The tender was unusual in construction, as it was carried on three pairs of wheels, and had capacity of 4000 gallons of water and 6 tons of coal.

The D. S. & S. had trackage rights over the Lehigh Valley to tide water, and the writer remembers, as a boy, standing on the station platform at Bethlehem and seeing one of their locomotives go by with a long string of loaded "coal jimmies."

The second design of 1894, to which reference has been made, covered three locomotives of the three-cylinder type built for the Erie & Wyoming Valley to specifications prepared by John B. Smith of Dunmore, Pennsylvania. The three 17x24-inch cylinders were placed in line across the engine, and their pistons were connected to the second pair of driving wheels, which had a cranked axle. The cylinders were placed on an incline of 4 in 35, to enable the inside main rod to clear the first driving axle. There were two castings in the cylinder group; one casting included the left-hand outside cylinder, while the other included the middle cylinder and the outside righthand cylinder. The middle cylinder was placed approximately 13 inches to the right of the center line of the locomotive, allowing room on the crank axle for three sets of eccentrics. The three cranks were placed 120 deg. apart. A boiler of the Wootten type, carrying a pressure of 150 pounds, provided 76 square feet of grate area and 1600 square feet of heating surface. The total weight of the locomotive was 120,000 pounds, with 104,000 on drivers, and the tractive force was 23,250 pounds, giving a ratio of adhesion of 4.47.

These locomotives were subsequently acquired by the Erie, and were rebuilt with new cylinders and boilers of modified design. As three-cylinder engines they apparently did fine work on heavy grades, but maintenance costs were undoubtedly high.

MOGULS ON THE P. R. R.

In 1895, the Pennsylvania R. R. built their first standard 2-6-0 type locomotives (Class F-1). The original standard designs, adopted in 1868-9, included two Ten-wheelers, but no Mogul. A few years later, Class I (subsequently H-1) appeared; a 2-8-0 with 20x24-inch cylinders and 50-inch drivers. This continued as the standard heavy freight hauler for about ten years, when the design was modernized and Class R (H3) appeared. The cylinder and driving-wheel dimensions were unchanged, but the boiler was greatly enlarged and the steam pressure was raised from 125 to 140, and then to 150 pounds. The new boiler had a Belpaire firebox placed above the frames. A total of about 700 of these locomotives were built and were distributed all over the system, and as long as speeds were moderate they did good work; but by 1895 they represented a general design that was rapidly becoming unfitted for heavy main-line service.

When John P. Laird was Master of Machinery at Altoona in 1862-1866, he rebuilt some old locomotives (including a group of Winans' "Camels") and turned them into Moguls; but they did not last long, nor did they exert any marked influence upon the future development of the type. Class F-1 was contemporary with the new 4-4-0 type passenger locomotives of the D-16 group, and the two classes had various features which were closely similar. These included the boilers, which, though differing somewhat in dimensions, were both of the Belpaire type, with fireboxes over the frames. The cylinders of the Mogul were 20″x28″, and with 62-inch driving wheels and a pressure of 185 pounds, the rated tractive force was 28,400 pounds. This represented an increase of 16 per cent as compared to the Class H-3 locomotives built in 1892; and the weight carried on the three pairs of drivers of the Mogul was 10 per cent greater than that carried on the four pairs of the Consolidation type.

Four of the locomotives included in the Class F-1 group were built as two-cylinder compounds, and were designated Class F-2. Four systems of compounding were represented; the vonBorries and the Golsdorf (both foreign), and those used by the Richmond Locomotive Works and the Pittsburgh Locomotive Works respectively. All four had cylinders 20 and 29 inches in diameter by 28 inches stroke, and carried a steam pressure of 205 pounds. After a few years' service, they were rebuilt with single expansion cylinders.

The next step in the development of the Mogul was to retain the cylinder and driving wheel dimensions of Class F-1, but to greatly enlarge the boiler, and increase the working pressure to 205 pounds. This was done in Class F-3, which appeared in 1901. A similar design, with 68-inch drivers and suitable for passenger service, was laid down on the drawing board but was never built. Much attention was being

given at that time, to the development of the wide firebox for burning bituminous coal; and late in 1901, Class F-3-b appeared, with a radially-stayed box measuring 66 inches in width. This design was soon changed to a Belpaire (Class F-3-c) and this was the final development of the Mogul on the Pennsylvania. The following table gives the principal dimensions and ratios of Classes F-1, F-3 and F-3-c.

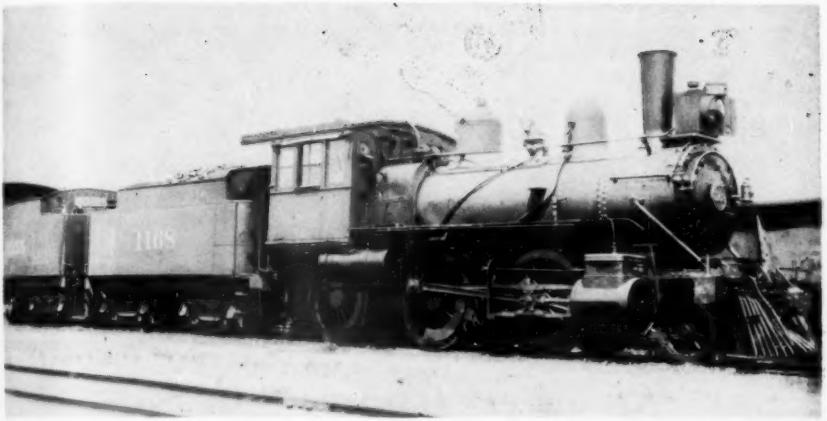
Class	F-1	F-3	F-3-c
Date	1895	1901	1902
Cylinders	20x28	20x28	20x28
Cyl. volume, cu. ft.	10.20	10.20	10.20
Drivers, diam.	62	62	62
Steam pressure	185	205	205
Grate area, sq. ft.	30	30.8	47.1
Heating surface, sq. ft.	1865	2431	2469
Weight on drivers, lbs.	126,500	142,050	142,900
Weight, total eng., lbs.	144,500	163,000	165,900
Tractive force, lbs.	28,400	31,480	31,480
Ratio, cyl. vol. to grate area	1:3.0	1:3.0	1:4.6
Ratio, cyl. vol. to ht'g surf.	1:182	1:238	1:242
Ratio, grate area to ht'g surf.	1:62	1:79	1:52

The Pennsylvania Moguls were built by the Altoona Works and the Baldwin Locomotive Works, and totaled more than 300. At least some of the Class F-3-c engines were later superheated, but the majority remained practically as built until they were scrapped.

THE WIDE FIREBOX

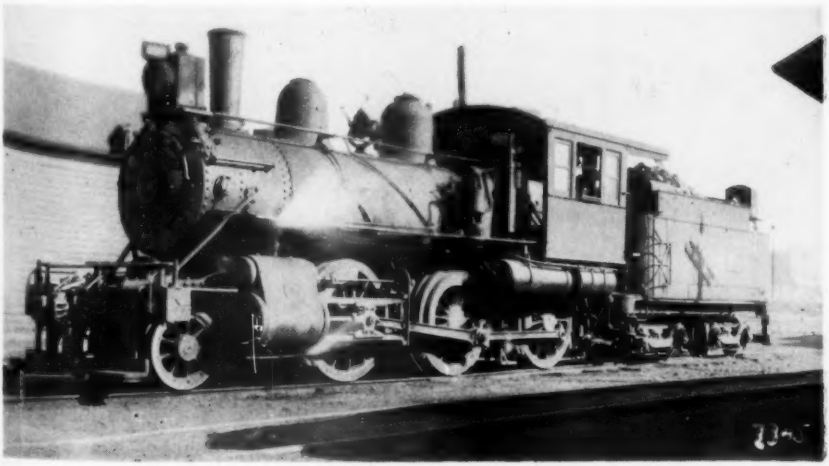
The introduction of the wide firebox for burning bituminous coal brought about conspicuous changes in the ratio of cylinder volume to grate area, and of grate areas to total heating surface. The ratio figures presented in the table which gives particulars of the Pennsylvania Moguls, clearly illustrate this. But when the firebox was placed above the rear drivers, as was the case in locomotives which had no rear truck, the depth of the box, and consequently the volume, were closely restricted; and the throat was sometimes so shallow that it was difficult to apply a brick arch supported on water tubes. The grate was necessarily sloped forward in order to provide maximum depth at the throat, and was frequently located in two planes; the steepness of the slope being changed over the rear drivers. It was difficult, with such a grate, to maintain an even firebed at the point where the hump occurred. The chief advantage of the wide grate was that it permitted coal to be burned at a slower rate per square foot; and this meant economy in fuel consumption, and less labor for the fireman. As a matter of fact, the old form of firebox, placed between the frames and axles, was very satisfactory, as it provided ample depth and volume in proportion to the grate area, and a brick arch could easily be placed in it. Since, however, the maximum grate area that could be obtained with this form of firebox was only about 18 square feet, it could be used only on comparatively small engines.

Shortly after the turn of the century, the Mogul type reached the highest point in its development; but the increasing need for units of greater horsepower capacity was beginning to crowd it out. Only two



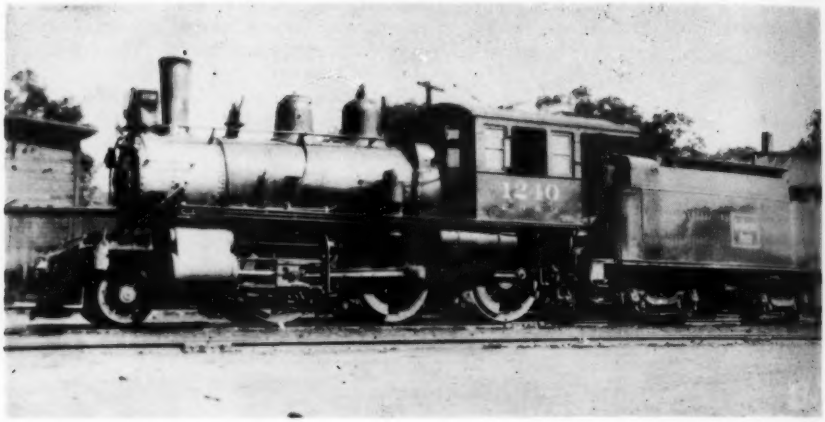
Courtesy of C. E. Fisher—O. H. Means

C. B. & Q. #1168 at Galesburg, Ill. Pittsburgh, 1898. H-2. 19x24" 64" 125000.



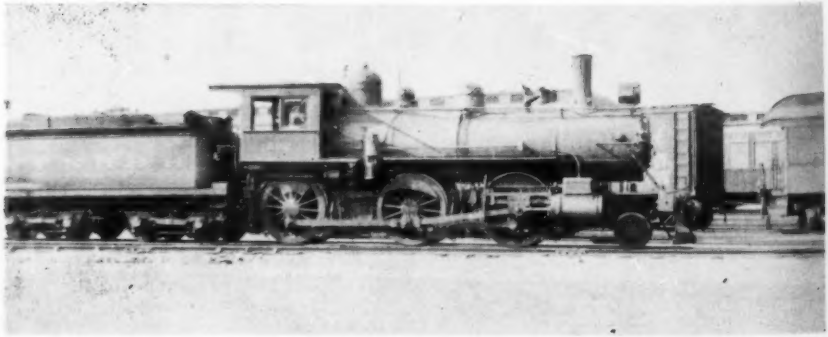
Courtesy of C. E. Fisher—O. H. Means

C. B. & Q. #1207 at Galesburg, Ill., West Burlington Shops, 1898, H-3. 19x26" 64" 131050.



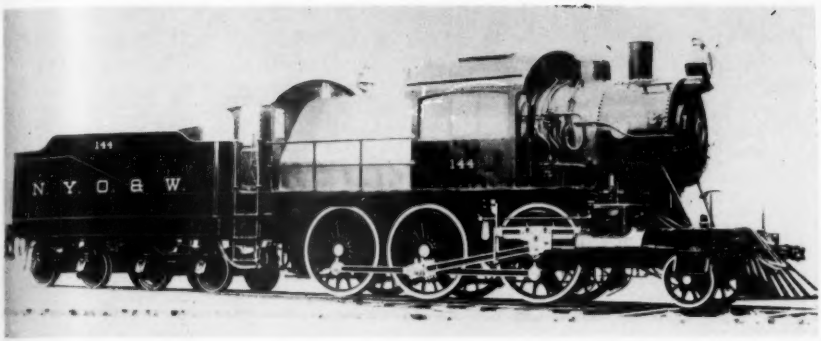
Courtesy of C. E. Fisher—O. H. Means

C. B. & Q. #1240 at Ft. Madison, Iowa, Rogers, 1900, H-4, 19x26" 64" 143500.



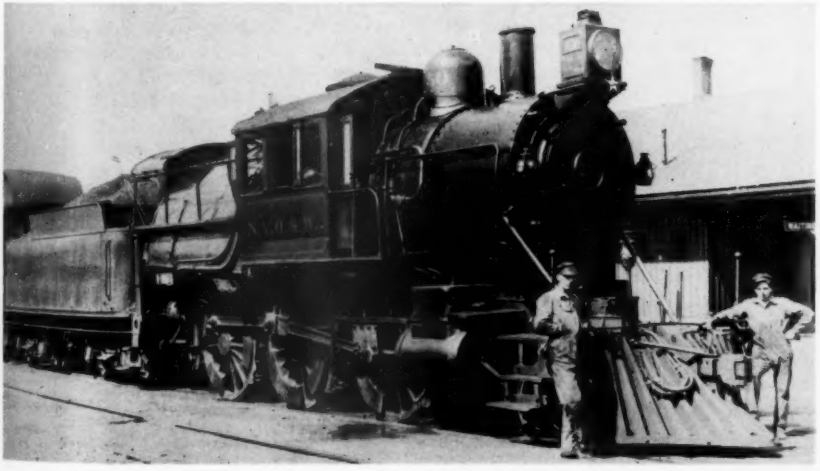
Courtesy of C. E. Fisher

**New Haven #602 at Readville, Mass. Class M-1. Old Colony R. R. 1892.
Built to handle heavy commuter trains at Boston. 19x24" 63" 115000.**



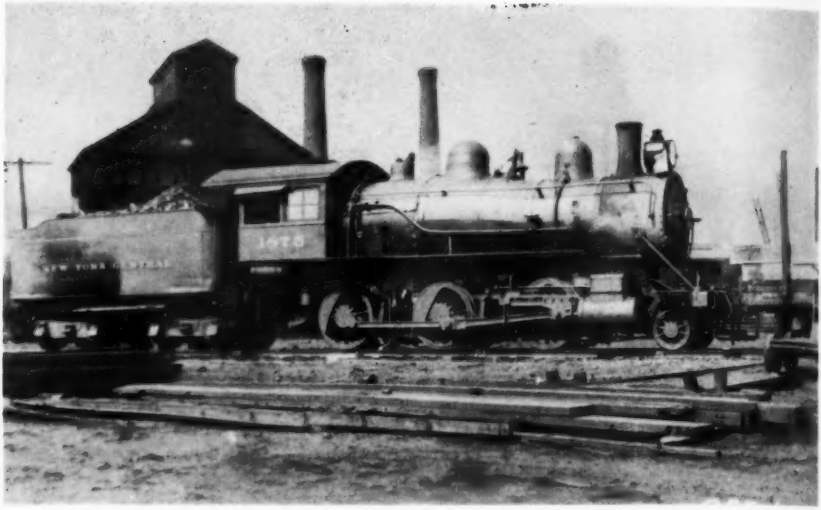
Courtesy of W. A. Lucas

N. Y. O. & W. #144, Dickson #1218, 7/1901. 20x28" 69" 156300.



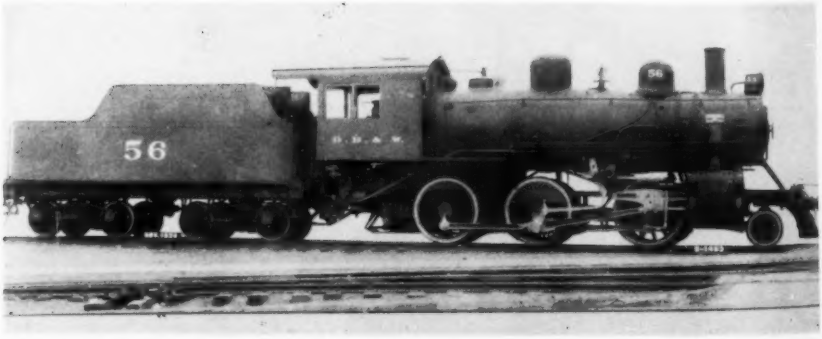
Courtesy of W. A. Lucas

N. Y. O. & W. #250, Cooke #30449, 1905.



Courtesy of C. E. Fisher

N. Y. C. #1875 at Rochester, N. Y. Depew Shops 1901. Shown as rebuilt in 1914, E-1b. 20x28" 57" 161000.



Courtesy of W. A. Lucas

Green Bay & Western #56, Schenectady #65975, 1924. 19x26" 56" 142500.

heavy Moguls were exhibited at the St. Louis Exposition held in 1904; one built by Baldwin for the Missouri, Kansas & Texas, and the other built by the Rogers Locomotive Works, for the St. Louis Southwestern. In addition to those, any number of fine examples might be cited to represent this type when it was making its last stand as a first class road engine. In New England, the Mogul was deservedly popular; the New Haven had a large group, with 20x28-inch cylinders and 63-inch drivers, which had an enviable reputation on account of their reliability, while on the Boston & Maine, a lighter design with 19x26-inch cylinders and the same size wheels, also rendered excellent service. Some of the B. & M. locomotives, later equipped with superheaters, handled much of the heavy suburban traffic in and out of the North Station in Boston. The New York Central had a design of Mogul with 20x28-inch cylinders and 57-inch drivers, which was admirably fitted for handling heavy tonnage on the low grades of the "Water Level Route." This same general design was also built as a cross-compound, with cylinders 22½ and 35 inches in diameter by 28 inches stroke. There is also described, in a publication of the American Locomotive Company issued in 1901, a generally similar locomotive with a boiler of the "Vanderbilt" type, in which the firebox was a cylindrical, corrugated flue, about 5 feet in diameter.

The series of standard locomotives built for the so-called "Harriman Associated Lines," the two largest of which were the Southern Pacific and the Union Pacific, included a wide firebox Mogul with piston valves. Such locomotives were built by both the American Locomotive Company and the Baldwin Locomotive Works.

In the years 1928-1930, ten heavy Moguls (Class M-21) were built by the Southern Pacific Company in their shops at Houston, Texas. These locomotives had 22x28-inch cylinders, 63-inch drivers and, with a steam pressure of 250 pounds, developed a tractive force of 42,400 pounds. The total weight was approximately 215,000 pounds, with 185,000 pounds on the drivers. They had wide fireboxes and Walschaerts valve gear. It would seem that very little publicity was given these locomotives at the time of their construction, although they are probably the heaviest Moguls ever built. They were subsequently transferred to the Southern Pacific of Mexico.

Leading particulars of a number of heavy Mogul type locomotives, all of which were in service during the early years of the present century, are given in an accompanying table. All, with one exception, were designed to burn bituminous coal.

ANTHRACITE BURNERS

Before closing this discussion of Mogul locomotives, further reference must be made to those designed to burn anthracite. The most extensive user of the type in the hard-coal region was the Delaware, Lackawanna & Western, on which the Mogul, back in the eighties and nineties, might be considered the standard freight hauler. The Philadelphia & Reading, Lehigh Valley, Central R. R. of New Jersey, and Erie, used the Mogul to only a limited extent, preferring the 4-6-0 type

Typical Mogul Type Locomotives—Period 1898-1908

Road	Builder	Cylinders	Drivers	St'm Press.	Grate Area	H't'g Surface	W't on Drivers	W't total	Tr. Force
Flint & Pere Marquette	American	18x30	56	180	30.8	1886	120,000	137,000	26,600
Boston & Maine	American	19x26	63	200	30.2	1893	121,000	140,000	25,300
Minn. & St. Louis	American	20x26	64	200	27.0	2194	120,000	141,100	27,600
St. Louis-S-Western	Rogers	19x26	61	200*	29.0	1898	127,000	145,000	26,200*
Panama R. R.	American	20x26	63	180	31.00	2203	127,500	147,500	25,200
Grand Trunk	American	20x26	62	200	33.4	2015	127,650	152,850	28,500
N. Y., New Haven & H.	American	20x28	63	200	44.1 (w)	2244	133,000	154,500	30,200
Mo., Kansas & Texas	Baldwin	20x28	63	200	46.7 (w)	2234	133,100	155,000	30,200
New York Central	American	20x28	57	190	30.3	2507	135,500	155,200	31,730
Del., Lackawanna & W.	American	20½x26	63	200	53.4 (w)	2342	140,000	161,000	29,500
A., T. & Santa Fe	Baldwin	15½&26x28	62	200	48.0 (w)	2599	135,000	164,000	29,970#
Penna. R. R. (F-3-c)	R. R. Co. & Baldwin	20x28	62	205	47.1 (w)	2469	142,900	165,900	31,480
Southern Pacific	Baldwin	15½&26x28	63	200	49.5 (w)‡	2257	144,120	166,320	29,200#
Bessemer & L. Erie	American	20x26	56	180	28.4	2057	145,400	167,850	28,410
Illinois Central	American	20x26	56½	200	32.6	2451	152,000	170,500	34,700
Associated Lines**	Amer. & Bald.	20x28	63	200	49.5 (w)	2102	152,500	179,200	30,200
Vandalia	American	21x28	63	200	52.0 (w)	2935	159,000	187,000	33,300

* Estimated; no definite record of steam pressure.

(w)—Wide firebox

Working compound (Vauclain 4-cylinder)

** These Harriman Line engines assigned to Southern Pacific and subsidiaries ‡ Oil burner

where six-coupled engines were required. The Delaware & Hudson, and the smaller roads in the hard coal regions, used the Mogul to a greater or less extent, but the writer has comparatively little information regarding them. Reference has already been made to the big Moguls on the Delaware, Susquehanna & Schuylkill, to the two passenger engines built for the Erie in 1884, and the Erie & Wyoming Valley three-cylinder engines built in 1894, all of which burned anthracite.

A typical Lackawanna Mogul, as built by the Baldwin Locomotive Works in 1876, had a wagon-top boiler with a long firebox, which was placed between the frames and over the rear driving axle. The grate area was 25.9 square feet, and the total heating surface 1286 square feet. The cylinder dimensions were 18″x24″, and with driving wheels 56¾″ in diameter and a steam pressure of 130 pounds, the tractive force was 15,200 pounds. Such an engine weighed 82,000 pounds, with 70,000 pounds on drivers. A conspicuous feature of the design, and one that was common to most of the Lackawanna locomotives of the period, was a stack of the "Bonnet" type, shaped something like a diamond but with the upper half omitted, so that the netting was exposed. The regular diamond stack was also used on many Lackawanna engines, both freight and passenger.

Subsequent to the introduction of the Wootten boiler in 1877, the Lackawanna adopted a modified design of that boiler, in which the combustion chamber was omitted. In 1887 the road was building, in its own shops, Moguls with central cabs (Mother Hubbards), having a grate area of 72 square feet, and 1409 square feet of heating surface. With 19x24″ cylinders, driving wheels 57¾″ in diameter, and a pressure of 140 pounds, the tractive force was 17,900 pounds. Such locomotives weighed 115,000 pounds, with 100,000 pounds on driving wheels. A pamphlet issued by the American Locomotive Company about 1907, shows the culmination of this general design—a Mogul with a grate area of 87.7 square feet and having 20½″x26″ cylinders and 63-inch driving wheels. Contemporary with these hard-coal burners were others designed for bituminous coal, and having a grate area of 53.4 square feet. Both classes carried a steam pressure of 200 pounds, and developed a tractive force of 29,500 pounds.

A comparatively small road, which extended into the anthracite region and hauled—and also burned—a considerable amount of hard coal, was the New York, Ontario & Western. The Mogul type was extensively used in both freight and passenger service. During the years 1901-1905, the Ontario placed in service 17 Moguls with modified Wootten fireboxes and 69-inch driving wheels; all were built with slide-valve cylinders and Stephenson link motion, and were genuine "Mother Hubbards" with central cabs. Of the first two, built in 1901, one came from the Dickson Works in Scranton, Pa., and the other from the Cooke Works in Paterson, New Jersey.* The Dickson engine had 20x28-inch

* In a red-covered undated pamphlet, on Mogul locomotives, issued probably about 1907 or 1908 by the American Locomotive Co., the Dickson engine (road number 144) is illustrated, but the dimensions apply to the Cooke engine (road number 143) built that same year.

cylinders, while the cylinders of the Cooke engines were 19½x28 inches. The weights and general dimensions of all were closely similar. It was the practice to use the high-wheeled Moguls in fast freight service in winter and passenger service in summer, when there was heavy vacation business to Catskill Mountain resorts.

An interesting feature which was used on the Moguls built in 1901, and probably on the others also, was a third bearing which was applied to the driving axles midway between the frames. This was worked out under the supervision of George W. West, S. M. P. Trouble had been experienced, on heavy power, with hot driving journals, and the third bearing apparently overcame much of the difficulty. The device is illustrated and described in an article published in the July 26, 1901, issue of *The Railroad Gazette.*

MOGULS WITH 78-INCH DRIVING WHEELS

A most unusual group of Mogul locomotives, operating in fast passenger service, appeared on the Philadelphia & Reading in the early years of the present century. That road had 11 locomotives of the Columbia (2-4-2) type, with 78-inch drivers, Wootten boilers and Vauclain compound cylinders, which had been built by the Baldwin Locomotive Works in 1892 and 1893. After running for about ten years in their original condition, they were converted into Moguls under the supervision of S. F. Prince, who was Supt. of Motive Power at that time. In rebuilding them, the boiler was raised somewhat, the combustion chamber was removed (thus lengthening the tubes and increasing the heating surface) and the original watertube grates were replaced by shaking grates. The front truck was not equalized with the drivers, but was independently loaded through a substantial deck casting which braced the frames in front of the cylinders. The whole gave one the impression of an ungainly machine, with an inadequate amount of boiler to turn so many big drivers. The locomotives were scrapped after a few years of service.

THE BIG VANDALIA MOGULS

One of the last railroads of importance to drop the Mogul type in new construction was the Vandalia, now an integral part of the Pennsylvania System. The American Locomotive Company's pamphlet, previously mentioned, describes two Vandalia Moguls.* The larger of these, built in 1903-1904, weighed 187,000 pounds, and carried 159,000 pounds on drivers. The cylinder dimensions were 21″x28″, and the driving wheel diameter was 63 inches. With a steam pressure of 200 pounds, this gave a rated tractive force of 33,300 pounds. A total of 27 locomotives of this general design were built, and some were subsequently superheated, the cylinder diameter being increased to 21½ inches. These locomotives constituted a notable group, well adapted to heavy freight service on comparatively level roads.

*See also the article by Charles E. Fisher in *Bulletin 92.*

One of the last Mogul type locomotives built for a Class I railroad, and intended for road service, was Green Bay & Western engine No. 56, built by the American Locomotive Company in 1924. This was a comparatively light engine, weighing 142,500 pounds, with 125,000 pounds on drivers. The cylinder dimensions were 19″x26″, and with 56-inch driving wheels, and a steam pressure of 180 pounds, the rated tractive force was 25,640 pounds. Superheated steam was used, and for an engine of its size and type, it was modern throughout and was attractive in appearance.

MOGULS FOR EXPORT

Throughout the period during which it was built, there were few engines of the Mogul type which could be described as "freaks." The great majority were simple in construction, and as the units were limited in weight and size, stokers were not required. No reference has been made to the many hundreds built for export, the majority of which were of narrow gauge. Reference should, however, be made to the remarkable orders received from England in 1899, and covering 80 locomotives for the Midland Ry., the Great Northern Ry., and the Great Central Ry. These Moguls were all of standard gauge, and were built by the Baldwin Locomotive Works and the Schenectady Locomotive Works. There were certain differences in the design of the several lots of engines, but all had 18x24-inch cylinders, and driving wheels approximately five feet in diameter. The British Railways were in urgent need of new motive power at the time, and the home builders were crowded with work; hence the orders came to America. While the locomotives were of course fitted with certain British specialties, they all had bar frames and outside cylinders, and in general design conformed to American practice. They were subjected to a great deal of criticism, much of it unreasonable. All had disappeared by 1915.

RIDING A MOGUL IN PANAMA

The writer has had opportunities, from time to time, to ride locomotives, but on only one occasion did he ride a Mogul, and that was under interesting circumstances. The ride was from Gorgona, mid-way across the Isthmus of Panama on the Panama R. R., to Panama at the Pacific end of the line, a distance of 25 miles; and the time, January 1912, when the Canal was under construction. The locomotive, with 20x26-inch cylinders and 63-inch driving wheels, had been built at the Brooks plant of the American Locomotive Company; the train consisted of 11 cars, and the running time was about one hour. This cannot be called high-speed work, but stops frequent, grades were steep and there was a great amount of curvature, and the writer was impressed with the skilful manner in which the engine was handled. Oil was used for fuel, and the firing was done by a colored man, who was an artist at his job. There was only a trace of smoke at the stack, except when the flues were sanded and a cloud of soot appeared—and that occurred twice on the run. In spite of the frequent changes in the demand for steam, the pointer of the steam gauge was apparently nailed at the 180-pound line;

and it is our recollection that the pops did not lift once. The engineman, who was from "the States," was also an expert; and was a very agreeable fellow, the trip was in all respects a happy experience.

The Mogul type has now practically passed out of existence, and the very few that are left—like B. & O. engine No. 600—may be regarded as "museum pieces." In his book on "The Steam Locomotive in America," the late A. W. Bruce estimates the number built in the United States, during the years 1860 to 1910, at 11,000. While greatly outnumbered by both the 4-6-0 and 2-8-0 types, they met a real need and did highly creditable work; and all true lovers of the old "iron horse" mourn the fact that the Mogul is no more.

BIBLIOGRAPHY—Much of the material presented in this article has been drawn from the publications of the Baldwin Locomotive Works and the American Locomotive Company, and from catalogs issued by several of the formerly independent works which were absorbed by the latter concern. The files of *The Railroad Gazette* have also been most helpful. Finally, as the author is now on the "retired list," he has been compelled to call on numerous friends for photographs and information. To all who have assisted in this way, he is most grateful.

The Goldfield Railroads

By Joseph F. Webber

GOLD! SILVER! The joyous lusty shouts heralding their discovery in the early 1900's in western Nevada's Tonopah, Goldfield, Bullfrog and Rhyolite areas made old men dance with joy, brave men to leave home and endure endless hardships to wander to the scene to try their luck in cashing in on the new riches.

It was this same drive that started at least three railroads racing to the Tonopah, Goldfield and Beatty mining towns. Mining camps that grew from sagebrush and sand, into cities; then back to sand again. The railroads too, grew, then like drifting sands disappeared from the desert.

This article deals with these deceased desert roads; those connected with the Tonopah, Goldfield and Rhyolite areas, whose histories were integral with the rise and fall of the mining towns.

In May 1900, James Butler, called the father of Tonopah, discovered gold in Saw Tooth Canyon; which was to become the town of Tonopah, Nevada. It was a rich find; and in short order hundreds of prospectors, speculators, miners, merchants and others poured into the area. Soon the town of Tonopah was born. Many famous mines were established, including such names as The Mizpah, Burro, Gold Mountain, Desert Queen and The Montana. In 1903, another great strike was made by Al Meyers and Tom Murphy in the Goldfield area. This was quickly followed by still another rich find in the Rhyolite area in 1904 by "Shorty" Harris.

In a few years many mines in the Tonopah area were endeavoring to ship ore to the nearest rail connection, some 60 miles distant. Only the high grade ore could bear the cost of wagon freight at $20 plus per ton, in addition to the several days travel. There were many teams on the rough roads, but still not enough to handle the traffic to keep the mines operating profitably. One of the leading mines, The Tonopah Mining Co., was faced with problem of some 100,000 tons of marginal grade ore in their dumps, with many more tons in the workings. It became apparent to realize any profit on the ore and the development work to get it, it was necessary to have cheaper transportation to the smelters. After due consideration the Tonopah Mining Company board of directors decided upon building a narrow gauge railroad from the nearest available point on the Southern Pacific's narrow gauge Nevada & California Ry. at Rhodes, Nevada, sixty miles distant, to Tonopah.

In the latter part of 1903, bids were requested on the 60 mile Tonopah Railroad. On January 1st, 1904 Mr. Paul Iglehart announced that the contract was awarded to the firm of McLean & McSweeny who were the successful lowest bidders. Construction was to begin within 10 days and the road to be completed within six months.

Sixty miles of rail was purchased from the Southern Pacific; the ties having been contracted for in Northern California. Equipment ordered included 15 freight cars ordered from J. Hammond & Co., San Francisco, Calif., for February delivery. Three locomotives were

ordered from Baldwin; one second-hand engine was purchased from the Nevada-California-Oregon to help in the construction.

Six months may have seemed perhaps too short a time to complete a sixty mile railroad. However, the work was unusually light. There were no important structures to build and topography along the route was such that "French" drains and box culverts were the only opening required. Nor were any heavy cuts and fills required. Mile after mile of the proposed road could be built on a 2 or 3 foot embankment. The grades and curves were light.

Construction began in the latter part of January 1904; the contractors being joined by the Collins & Young Co. Rail laying followed the grading well, and by March some one half mile of track a day was being placed. As each contractor completed his portion of the work, he would leap-frog his competitor and begin a new stretch. Some delay was occasioned by a rock cut and fill of some 14 to 16 feet that the added firm of Oddie & Overberry contracted for. By April 1904 however, the lack of rail and ties were a serious delay to further progress. Rails and ties were accumulating in the Nevada & California's yards at Mound House. A shortage of flat cars and locomotives was cited as the reason for shipping delays. The Tonopah Railroad officials offered the use of their loco and cars to alleviate the shortage, but the N&C declined to have "foreign" equipment on their rails. So, rail work trickled almost to a halt until more supplies were available, then work progressed rapidly.

Early in April 1904, the Tonopah Railroad announced it would start passenger and freight rail service from Rhodes to the railhead at Coaldale, Nevada. It appears however, that the railroad neglected to file their common carrier bond with Nevada's Secretary of State. This gave John O'Keefe, the operator of the Sodaville to Tonopah Stagecoach Line the opportunity to block the railroad's efforts. Since O'Keefe held the mail contract and was the only passenger transportation service between Coaldale and Tonopah, he brought about a demurrage suit against the Tonopah Railroad and was sustained by the courts. Knowing the railroad would not go into the stagecoach business too, he stood his ground, refusing to change his service from Sodaville to Coaldale, unless his terms, as to rates on the whole district were met.

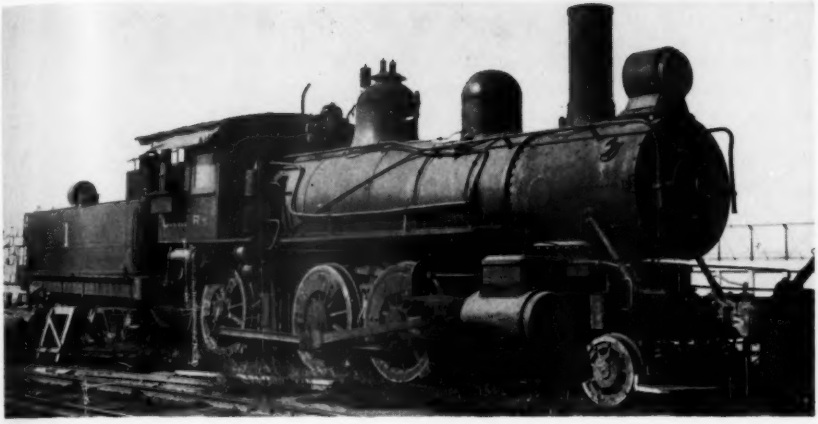
A few weeks of verbal bargaining did not budge O'Keefe from his stand, so, finally Supt. Tripp announced that the railroad would give in and agree to his terms. O'Keefe had full say in handling the business all the way from Sodaville; and the railroad agreed not to make any contracts independently of him, even over their own right of way. This agreement, bitter as it was for the railroad to accept, would last only until the railroad was completed to Tonopah. Needless to say all haste was used to finish the project. With the settlement of the suit, shuttle service to Coaldale began. Shortly after the above service started, the Tonopah railroad had its first wreck. On Sunday, July 17th, 1904, a few miles west of Deep Wells, spreading rails caused the derailment of a locomotive and several cars. Other than the delay and inconvenience of having to walk several hot desert miles, no injuries were reported, and only slight damage to the equipment.

Courtesy of Henry E. Huntington Library & Art Gallery

Tonopah, Nevada—1903.

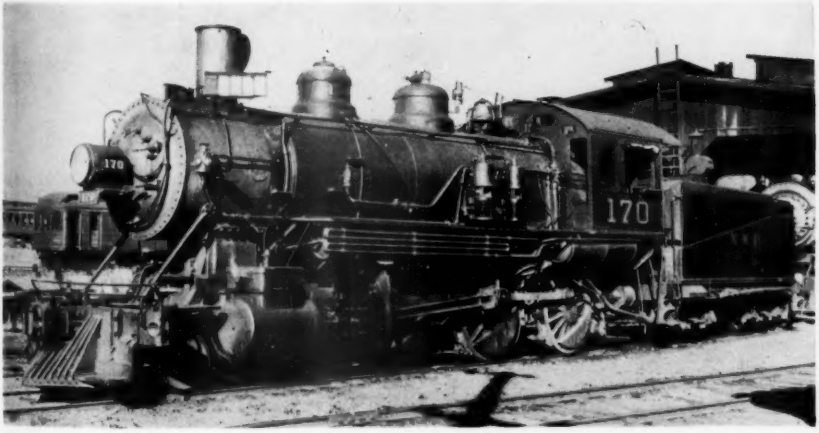
Courtesy of Henry E. Huntington Library & Art Gallery

Goldfield Nevada Reduction Co. at Goldfield, 1907.



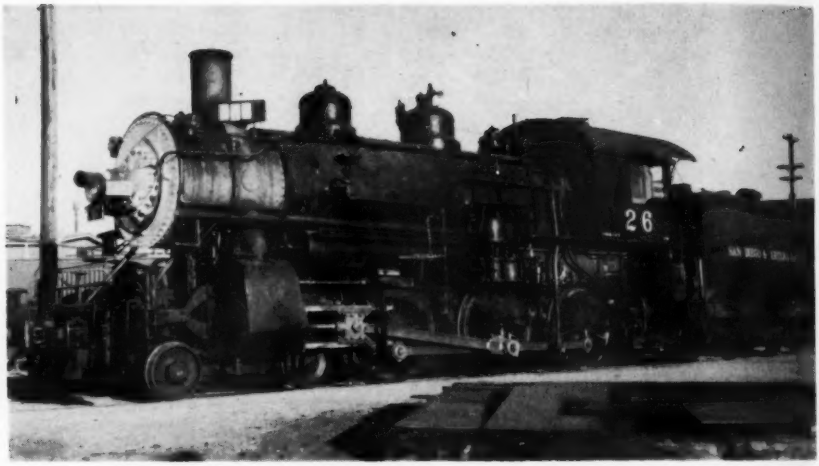
Courtesy of R. Berry

Outer Harbor Term. Ry. #1 at San Pedro, Cal. Ex S. P. L. A. & S. L. #5, L. V. & T. #1 and L. A. T. #5. Baldwin #11867, 5/1901.

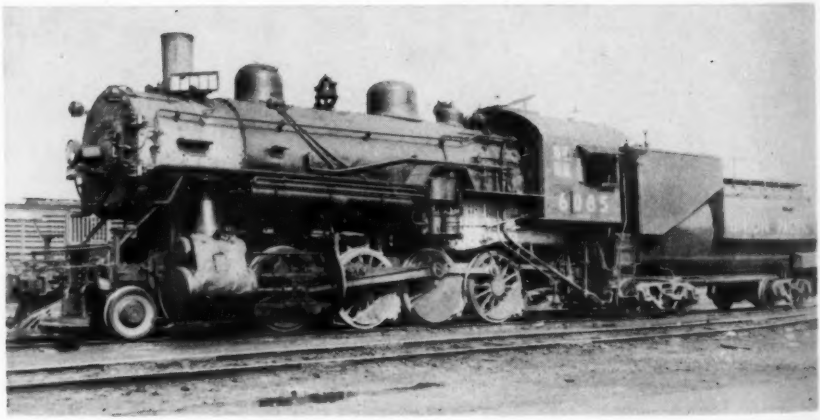


From Webber Collection

Northwestern Pacific #170 at Sausalito, Calif., 5/1939. Ex L. V. & T. #4, Baldwin #30105, 1907.



S. D. & A. E. #26 at San Francisco, 10/1949. Ex L. V. & T. #10; S. P. #2386.



Courtesy of W. R. Hicks

Union Pacific #6085, Brooks #44751, 12/1907, at Los Angeles, Cal., 1/1947.
Originally L. V. & T. #31, L. A. & S. L. #3676.

The Tonopah Railroad was completed to Tonopah, now a town of 5000 citizens, on July 22nd, 1904. That night the last of the stagecoaches were to complete their runs. The first train was set to travel over the line, arriving the following day.

THE BIG DAY ALL TONOPAH HAD WAITED FOR!

5:15 Monday morning July 23rd, 1904, the first passenger train arrived! Brought in on steam generated from the Coaldale mined fuel. The special carried Gov. Sparks and wife, the Tonopah R. R. officials and 150 passengers. Every whistle in camp, innumerable bells and guns heralded the coming of the train. Truly it was a joyous occasion; but even these hardy westerners weren't quite up to such an early morning celebration. By mutual consent the official start of the Railroad Day Celebration was postponed until 1:00 P. M. that afternoon. It was doubtful that many actually got any rest as the town was overflowing with people bent on enjoyment.

Promptly at 1:00 P. M. the program was underway with a prayer by Rev. F. H. Robinson, followed by a welcoming speech by acting president Bowler; followed by a stirring speech by Gov. Sparks. Then, that good old American custom of crowning a pretty girl, Miss Belle Pepper, Queen of the Carnival. Her Majesty Queen Belle broke a bottle of champagne over a "Golden Spike," and declared these regal words, "I christen thee the last spike of the Tonopah Railroad." Gov. Sparks and Supt. Tripp drove in the last spike—the railroad was completed! Let the celebration begin; and begin they did Three days, July 25th, 26th and 27th were declared Railroad Days. Each day featured parades, brass bands, foot races, rock drilling contests, street dancing, baseball games, free-for-alls and the like. The last evening of celebration was the most novel, with a display of fireworks. So spectacular were these, that many an Indian was observed scattering to the hills, thinking the white man had gone mad.

A depot at Tonopah had not yet been built, but this was soon remedied by awarding a contract to the Tonopah Lbr. Co., to construct a depot generally in keeping with the usual type found on the Southern Pacific lines. The estimated cost was $8,000.

The Tonopah Railroad was a money maker from the start. The large traffic of ore going out of Tonopah, was matched by the incoming loads of heavy mining machinery, lumber, manufactured goods and of course, the steady stream of passengers to the mine areas. The road made mining more profitable and was instrumental in opening new camps.

By 1905, the Goldfield minefields had built up large scale ore production. Some of the well known mine companies included such names as Combination, Florence, Mohawk, Simmerone, Jumbo, and January. The latter two mines had removed ore assayed at $251,440.55 a ton! Goldfield was soon to become a "high graders" paradise. Who could resist the attraction of such riches? Small wonder that the Tonopah Railroad was influenced to extend rail service to Goldfield. In February of 1905, the Goldfield Railroad was incorporated to build a narrow gauge

line from Tonopah to Goldfield, Nevada, a distance of 30 miles. The road was completed in the summer of 1905; the grade being held to 1.5%, which was four tenths less than expected.

The first train to Goldfield left Tonopah at 9:40 on the morning of September 9th, 1905, and arrived in Goldfield at 10:50. The train consisted of engine No. 1, a baggage car, a mailcar, a day coach and the pullman sleeper "Zerbino." Crew members were Sam Parker, conductor; P. D. Payne, engineer; A. A. Peterson, fireman; and brakemen Tom Williams and M. P. Cortes. The train's run was spectacular when compared with the stagecoach line, which took five hours to make the same trip. The "Official Opening" special arrived 10:50 A. M., October 14th, 1905. The train was made up of engine No. 6, five coaches and an express-baggage car. Conductor Byrne and engineer Beckmen shared the honors. Among the party of 41 railroad officials and 181 jubilant passengers, were Mr. Thomas King, ex President of the B&O, and Mr. Mills, C&O vice president. Mr. King and Mr. Miller concurred that the Goldfield Railroad was on a par in comfort and speed to the best eastern roads. It goes without saying that the special was received in true western hospitality; after which the tired but happy party returned to Tonopah.

On November 1st, 1905 the Tonopah Railroad and the Goldfield merged into the then incorporated Tonopah & Goldfield Railroad. Capital stock authorized and outstanding was $2,150,000, comprised of $1,650,000 common stock and $500,000 preferred stock; shares were $100. The directors were listed as John W. Brock, R. H. Rushton, Charles R. Miller, James S. Austin, Henry D. Moore, O. A. Turner, C. A. Higbee, C. A. Daniels, R. J. Park, Wm. M. Potts, Thomas M. King, Geo. S. Nixon, and T. L. Oddie. Officers were listed as John W. Brock, President; R. H. Rushton, Vice pres.; Charles R. Miller, 2nd Vice pres.; Clyde A. Heller, Secretary and Treasurer.

The T&G continued to prosper. Its first eight months were to produce a net earning of $465,833; and 1907 showed a dividend of up to 13½% on preferred stock and to 10% on common stock.

An indication of how great were the ore and machinery traffic is evidenced by the fact that the Southern Pacific's Nevada & California R. R. was hard pressed to handle the load. Due to the transshipping with the Virginia & Truckee R. R., from narrow gauge equipment to standard and vice-versa, shipments gradually became hopelessly delayed at Mound House. The Southern Pacific endeavored to purchase the Virginia & Truckee R. R., but the V&T probably regretting its sale of the Nevada & California, placed its line at a price considered more than the Southern Pacific was willing to pay. Failing to swing the V&T deal, and dissatisfied with the costly and bothersome freight transfer, the Southern Pacific decided to build a standard gauge line from its main line at Hazen to Churchill, Nevada; and the Nevada & California was standard gauged to Tonopah Jct. The new line, known as the Hazen cutoff completely bypassed the Virginia & Truckee, and eliminated the ore carrying revenues.

Although the Nevada & California had a three-rail roadbed between Mina and Tonopah Jct., the Tonopah & Goldfield Railroad was soon to standard gauge its Tonopah line. On August 13th, 1905 the last narrow gauge train passed over the road that morning. During the day the 50 lb. rail was replaced by 65 lb. rail, and the road standard gauged; the first broad gauge train reached Tonopah that night. It was late in 1906 before the Goldfield section was standard gauged; and by 1907 the narrow gauge locomotives and cars were sold.

TONOPAH & TIDEWATER R. R.

All of this mining activity had been keenly observed by Francis Marion "Borax" Smith, a legendary desert figure whose description was aptly described in the April 14th, 1906 edition of the Beatty-Bullfrog "Miner."

"Francis Marion Smith, the 'Borax King,' who amassed a fortune of $20 million dollars from his discovery of borax in the Death Valley area, is a well preserved gent of about sixty. He left Wisconsin when he was 21 years old, and was in Austin, Nevada in 1867; built the third house in Reno, but found it was in the street when the town was laid out. Worked at mines in Lyon and Esmeralda counties.

"While cutting wood in Miller Mountain near Tonopah in 1872, Smith looked with curiosity on Teel Marsh, which differed in appearance from ordinary alkali deposits. He investigated the rich borate deposit and laid the foundation of his $20 million fortune.

"In 1872 the borax consumption in the United States was only 500 tons. 'Borax' Smith won his name by increasing that amount to 20,000 tons.

"F. M. Smith knows the needs of transportation for the desert mines. He has freighted borax over the burning sands with 20 mule teams, and steam tractors for 30 years."

Indeed, "Borax" Smith knew the need for better desert transportation. It was to provide a rail outlet for borax mined by the Pacific Borax Company and the Lila C mine, that he undertook to build a railroad from Las Vegas, Nevada. In the Fall of 1904 Smith had a survey made, and started to grade some 12 miles of roadbed. However, a disagreement arose between Smith and the Los Angeles & Salt Lake R. R. over rate charges on construction materials. The disagreement could not be resolved, so Smith stopped operations, and moved to Ludlow, Calif., to begin anew.

The Tonopah & Tidewater R. R. was incorporated on July 15th, 1904 to build a standard gauge railroad from Ludlow, California to Tonopah, Nevada. The road was financed and controlled by the Pacific Borax Company Ltd.; capital stock of $1,000,000 in $100 shares. Directors were listed as F. M. Smith, C. B. Zabriskie, J. A. Middleton, DeWitt Van Buskirk, J. W. Hardenberg, C. S. Noe, Geo. Corragan. Officers were F. M. Smith, president; DeWitt Van Buskirk, vice pres.; C. B. Zabriskie, sec. and treas.; B. W. Fernald, auditor; John Ryan, gen. mgr.; J. M. Van Dewerker, chief engr. One hundred miles of 65 lb.

rail was purchased from the Santa Fe Railroad. This in addition to some 100 miles purchased in Texas, and was to be just 45 miles short of its intended goal.

On August 30th, 1905, C. M. Roser and John Ryan, in charge of the construction, had the grading started from Ludlow, California on the AT&SFe, towards Tonopah. The first rails were laid on November 26th, 1905; four days later the first locomotive, a second hand Santa Fe ten wheeler arrived to help with the construction. February 20th, 1906 found the road completed to Crucero, Calif.; making connection with the Los Angeles & Salt Lake. The "Smith Road," as it was locally known, was going to Tonopah or bust; the outcome of which we are shortly to learn of.

LAS VEGAS & TONOPAH R. R.

This railroad had reversed todays trend of railroads to highways. It started as an automobile transportation venture, then became a railroad.

J. Ross Clark, Nevada Senator Wm. A. Clark's brother, C. O. Whittmore and others organized an auto line to furnish transportation to the Bullfrog and Beatty mining areas. The fares were about $25 per person. Due to the poor road conditions and the lack of passenger carrying capacity, it was a costly venture. After losing some $25,000 the founders decided to join Sen. Clark, who had recently completed the Los Angeles and Salt Lake Railroad, and build a railroad from Las Vegas to Tonopah. On September 22nd, 1905 the Las Vegas & Tonopah Railroad was incorporated under the laws of Utah. The directors were listed as Wm. A. Clark, Wm. A. Clark, Jr., J. Ross Clark, W. H. Comstock, R. J. Waters, R. C. Kerem and C. O. Whittemore. The officers were J. Ross Clark, president; C. O. Whittemore, vice pres.; W. M. Comstock, secretary; R. J. Waters, treas. Capital stock of $4,000,000 was authorized, of which $1,500,000 was outstanding.

After Sen. Clark had completed the San Pedro, Los Angeles & Salt Lake R. R., Harriman and the Oregon Short Line acquired a one half interest in the line. It was assumed that these financial giants were to be a part of the new "branch." This was not the case however, as Sen. Clark elected to built the LV&T as a private enterprise, thus he was its largest stockholder. Sen. Clark lost no time in acquiring the interests that "Borax" Smith had in his ill fated road; and construction of the "Clark Road" was shortly started to try to beat the "Smith Line" to the Tonopah area.

The railroad building race was on! By February of 1906 rails were laid to about 25 miles west of Las Vegas; grading was completed some 30 miles, and the advance camps were 55 miles out. S. L. Mendenhall, one of the contractors, had 400 men at work, at "good" wages of $1.75 to $2.25 per day; and were laying about one mile of track a day. The graders were far ahead of the rail gang due to several small bridges being necessary to cross the desert gullies. The delay was quickly overcome permitting the start of short rail service. The first train left Las Vegas at noon on March 8th, 1906, going as far as Indian Creek,

some 44 miles distant. The motive power consisted of two leased S. P. L. A. & S. L. 4-6-0's.

On March 24th, 1906 using their track laying machine, the LV&T track gang, made a new record by placing 2 miles and 2,000 feet of trackage in one day. At a steady pace, the line was completed to Johnnie, as noted in timetable No. 4 below:

Timetable #4

To take effect Friday, May 25th, 1906 at 12:01 AM mountain time; superseding timetable #3, dated March 6th, 1906.

WEST No. 11 Mixed-Daily	mls.			mls.	EAST No. 10 Mixed-Daily
12:30 PM	0	lve	Las Vegas arr.	74.5	8:35 PM
f 1:40	23.2		Corn Creek	51.5	f 7:35
f 1:55	27.8		Owens	46.7	f 7:25
s 2:35	43.6		Indian Springs	30.9	s 6:45
f 3:40	59.4		Charleston	15.1	f 6:05
4:30	74.5		Johnnie	0	6:15

NOTICE: No. 10 will wait at Johnnie until arrival of No. 11

Special Rules:

1. Eastbound trains are superior to trains of the same class in opposite directions.
2. All trains will register at Las Vegas and Johnnie.
3. Trains must not exceed scheduled time between Indian Springs and Johnnie.

The road was off to a profitable year as the first four months financial figures showed. Passenger earnings were $5,505; freight earned $12,989 for a total of $18,494; operating expenses were $13,829 leaving a net of $4,665.

BULLFROG-GOLDFIELD RAILROAD

Meanwhile, the mine fields at Bullfrog were booming; Rhyolite had become a busy metropolis. Many mines were active and many more were abuilding. One of the more famous was the Montgomery-Shoshone, a fabulous mine which had ore to $200,000 a ton. What a bonanza! It was to reach these new riches that the Tonopah & Goldfield R. R. organized the Bullfrog-Goldfield R. R. which was incorporated on August 3rd, 1905. Capital stock was $2,000,000. Officers and directors were the same as the Tonopah & Goldfield R. R., but the B-G was operated as a separate corporation. The Bullfrog-Goldfield was to build a line from the T&G at Milltown, Nevada, to Beatty, 72.78 miles; Beatty to Rhyolite, 7.79 miles. Trackage rights over the T&G from Milltown to Goldfield, 1.08 miles.

Tonopah & Goldfield president John W. Brock did not wish to disclose any plans relative to the T&G's extension to Beatty, in fact he would not confirm or deny the rumors of the day. Perhaps, he had his eye on the race between the Clark Road and the Smith Road. In due time however, his intentions were made known. The Bullfrog-Goldfield R. R. was ordered built, as a standard gauge line, to Beatty. Six loco-

motives were ordered from Baldwin, and 2 new coaches ordered from the Pullman Co.

Construction of the "Brock Road" began early May 1906. By June 23rd, 1906, the road was graded to 15 miles south of Goldfield. Brock was able to get his survey teams early into the Amargosa River valley area in time to take possession of the good passes, before the Las Vegas & Tonopah advance team could stake their line. So, now we had three roads reaching for the Beatty-Rhyolite mine areas.

In July of 1906, a meeting was held between LV&T pres. J. Ross Clark, T&G president John Brock and other rail officials, to confer on the duplication of rail service between Beatty and Goldfield. Consolidation of the Las Vegas & Tonopah and the Bullfrog-Goldfield R. R.'s was a rumored possibility. It was also rumored that Clark and Harriman proposed to dominate the ore carrying trades of Southern Nevada; thus Brock's T&G traffic would be a dependency on Harriman's Southern Pacific and subservient to Harriman and Clark. It was suggested that the Bullfrog-Goldfield would be effectively curbed from building to Beatty. Facts seemed to prove otherwise. Consolidation did not take place and the Brock road continued to build its line toward Beatty.

Clark's LV&T now reached to Rose's Well, 100 miles from Las Vegas, and was pressing on. Considerable delays were caused by the lack of ties and other supplies but by September of 1906 the grading was completed to Beatty; and by October 11th, the track was completed to Beatty. The "Clark Road" wins the race! On October 12th, service from Las Vegas to Beatty was established, as reflected in the new timetable No. 8 below—

WEST #11		EAST #10
Daily 11:00 leave	Las Vegas	arrive Daily 4.05 PM
11:55 AM	Mile 15	3:15
12:20 PM	Corn Creek	2:55
12:35	Owens	2:40
1:25-1:55	Indian Springs	1:55-1:25
2:55	Charleston	12:40
3:50	Amargosa	11:30
4:30	Mile 88	10:35
5:00	Rose's Well	10:00
5:10	Mile 105	9:45
5:45	Gold Center	9:20
5:55	Beatty	9:10

No.'s 10 & 11 will meet at Indian Springs.

The Official Railroad Celebration Days were set for October 22nd and 23rd, 1906. This was the day the first thru Pullman train service specials were to arrive from Los Angeles and Salt Lake. Again, a gala celebration was planned.

Promptly at 9:00 P. M., October 22nd, the first special arrived at Beatty, bringing president Clark and other rail officials, the Los Angeles Union Band and several hundred excursionists. The train was greeted by cheers, fireworks, cannon salutes and the inevitable brass bands. The whole town was decorated in flags and bunting, and was lighted from thousands of Japanese lanterns. A hearty welcome was given to the

merry making officials, travelers and guests. Many parties were spontaneously erupting. At the reception given in the honor of Sen. Clark and party, at the Montgomery Hotel, President J. Ross Clark made the following "official" statement (From the Oct. 27th, 1906 issue of the Beatty-Bullfrog Miner). (One can imagine the gentle murmur of voices and the tinkling of glasses).

"We appreciate your cordial welcome. We know that you have waited long and patiently for us, and we regret the circumstances, over which we had no control, have prevented our reaching you months ago. But, now that we are here we bring you assurances of our desire to cooperate with you in the development of this wonderful region; of which the world at large knows but little yet. It will be the policy of the Las Vegas & Tonopah Company to afford you every facility in the way of freight and passenger rates and service; to develop the resources of this wonderful country to the fullest extent.

"We hope you will understand that conditions are new as yet, and that there will be mistakes made which we will endeavor to rectify as fast as we know of them. Our object will be to treat you fairly and justly, and to serve you to the fullest extent of our ability.

"This is a new country. The railroad is new. The conditions are not yet settled; and it will take some time for us to get everything running smoothly. We ask you to be patient and considerate and in time we will give you service equal to that of any other railroad that runs thru similar country, under similar conditions. Our object will be to give you such rates on machinery and supplies brought into the country, and on ores shipped out of it, as will enable you profitably handle the greatest quantities of low grade ore in this district. And now that we have reached Beatty, we want you to understand that we are not going to stop. It is our purpose and intention to push on to Rhyolite, your sister town in the hills above; and then on to Goldfield; as fast as materials and supplies can be assembled.

"It is our purpose to extend spurs to your bigger mines so that ore can be loaded directly from the mines into the cars, and in this way save the expense of extra handling.

"I again thank you for your welcome, which I feel is as sincere as it is cordial."

True to his word, the "Clark Road" was extended to Rhyolite by December of 1906; making the line's total length 123 miles.

By December of 1906, the "Brock Road" was graded to within 15 miles of Beatty; the track laying gang just 5 miles behind. There were more than 400 men on the job and it was about the latter part of December that the Bullfrog-Goldfield was completed into Beatty. More celebrations heralded the bringing together of the rails. Thru service from Las Vegas to Tonopah was not yet provided; however, the rails were ready for the proposed service.

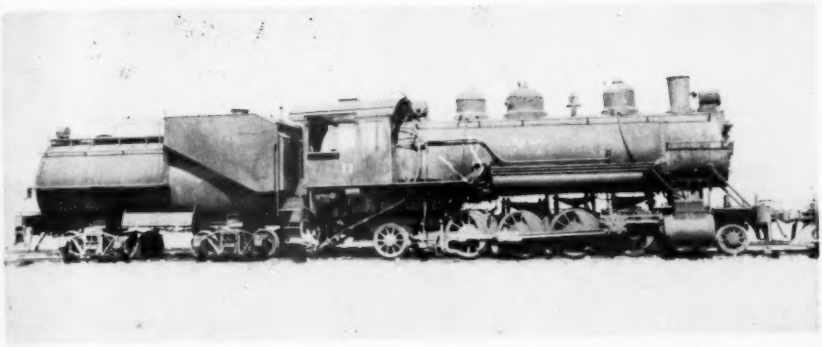
The same time found Smith's Tonopah & Tidewater Railroad still in the Amargosa Valley of Death Valley. Considerable rock work and heavy grading was keeping his 800 men and 400 teams busy. All efforts had been concentrated on completing the line to the Lila C mine. It was to be another year before the Tonopah & Tidewater was to reach Beatty.

THE LAS VEGAS & TONOPAH R. R. CONTINUES NORTH

Unable to consolidate with the Bullfrog-Goldfield R. R., and since the B-G had taken possession of the best passes thru the Amargosa River valley, the LV&T endeavored to locate an easy grade from Rhyolite via Gold Bar and Gold Mountain. However, heavy grades were encountered at Mud Springs. Construction of the road became expensive. Not only was the roadbed difficult, but the competition by the gold mines at Bullfrog and Goldfield forced wages up. The base rate went to $4.00 a day, less $1.25 for board. However, in the custom of the day, these increases were passed on to the shipper in form of higher rates. It wasn't until October of 1907 that the Las Vegas & Tonopah completed its final length of 195.72 miles from Las Vegas to Goldfield, Nev.

The Fall of 1907 found the Tonopah & Tidewater R. R. crossing the California-Nevada border and advancing to Gold Center and Beatty. The "Smith Road" finally completed the line to Beatty on October 30th, 1907, approximately one year later than the Las Vegas & Tonopah. Conductor G. A. Parker brought the first T&T train into Beatty on the evening of October 27th. It was a freight train to which a passenger coach had been added.

Traffic Manager R. Albeger announced that the first passenger train service between Los Angeles, California and Beatty would begin on December 5th, 1907. One passenger would leave Beatty at 5:00 P. M. and would arrive in Los Angeles at 8:20 A. M.; the other train would leave Los Angeles at 8:00 P. M. and would arrive in Beatty at 10:45 A. M. Trains were to consist of buffet sleepers and chair cars without additional charge. The first Beatty to Los Angeles train left Beatty on Thursday evening December 5th, under the direction of Conductor Hummel. The first passenger train from Los Angeles arrived in Beatty on the 6th of December. Again, the royal welcome was given to the rail officials and passengers by the citizens and business people of the town. A thirty-five gun salute was fired and the completed train service was commemorated by breaking two bottles of wine over the train wheels; several other bottles were broken in the more conventional and refreshing manner. Service was extended to Rhyolite, via the Bullfrog-Goldfield. A word should be added here regarding the depot at Rhyolite, Nevada. This station was served by the three railroads, the LV&T, BG, and the T&T, and was considered the "Dearborn Street Station of the West," due to the considerable traffic and the only station in the State of Nevada having three railroads competing for service at the time. Today the depot is being used as a combination bar and museum, and is the only building intact in the city.

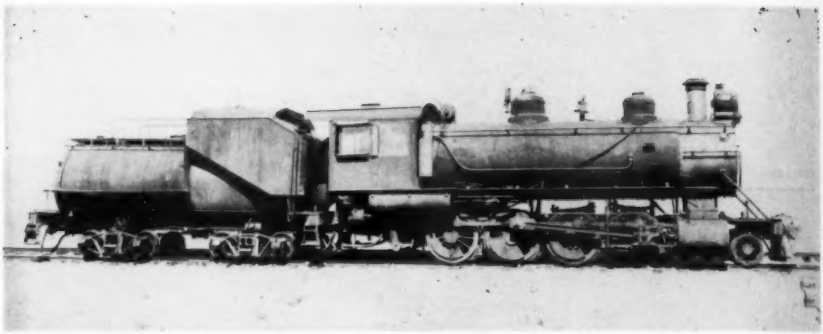


Courtesy of R. Gray

T. & G. R. R. #11 at Blair Jct., Nevada, 3/1948. Baldwin #41299, 4/1914.
Ex Mason Cty. Logging Co. #9; C & C #1.

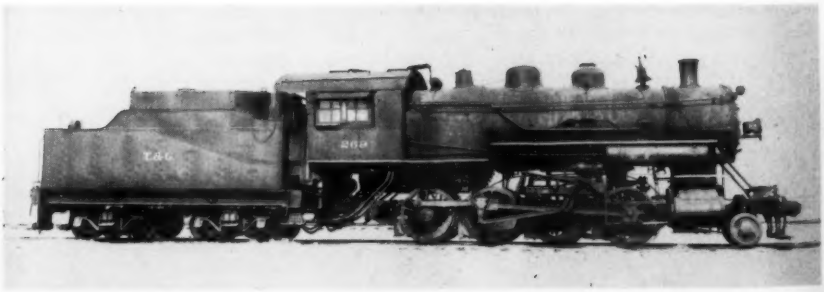
Courtesy of R. Gray

T. & G. R. R. #52, Baldwin #25169, 1905.



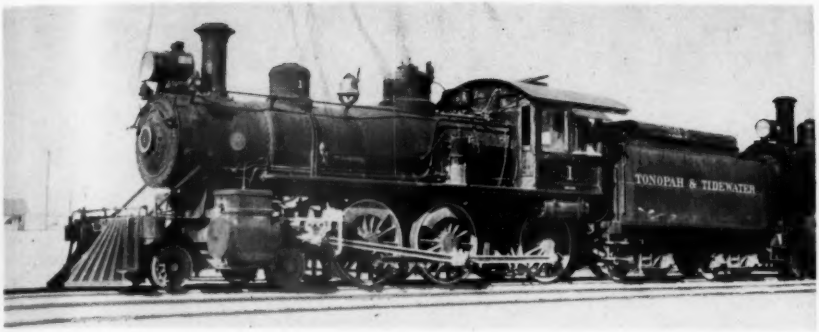
Courtesy of R. Gray

T. & G. R. R. #53 at Blair Jct., Nevada, 3/1848. Ex T & T #7, Baldwin #31750, 9/1907.



Courtesy of R. Gray

T. & T. R. R. #269 at Tonopah Jct., Nev., Brooks #26469, 1903. Ex B. R. & P. #259, A & S #269.

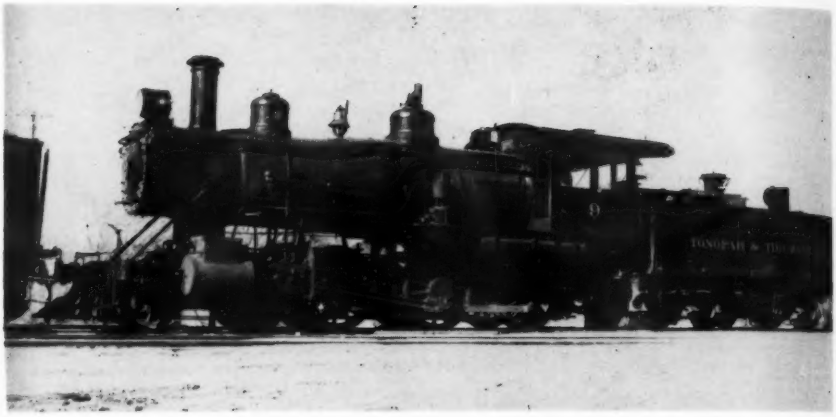


Courtesy of R. Berry

T & T. R. R. #1 at Death Valley Jct., Cal., 2/1940. Baldwin #14418, 1895, ex A. T. & S. Fe #260.

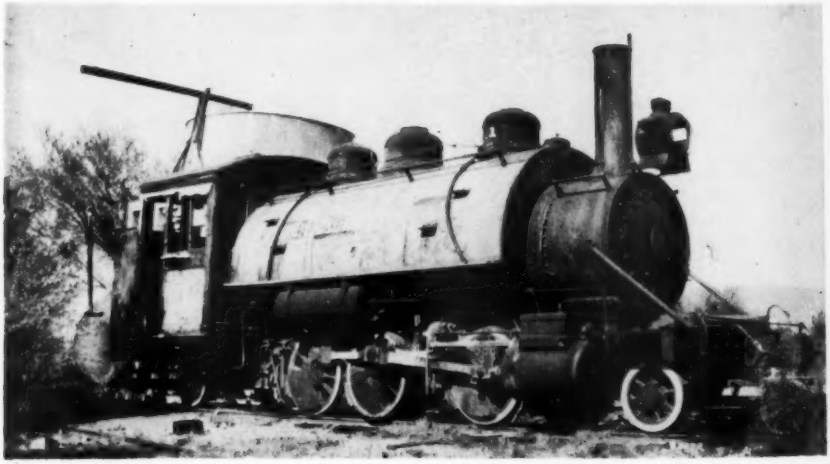
Courtesy of R. Berry

T. & T. R. R. #7 at Death Valley Jct., Cal., 2/1941. Baldwin #31790, 9/1907.



Courtesy of R. Berry

T. & T. R. R. #9 at Death Valley Jct., Cal., 2/1940. Baldwin #32292, 11/1907.



Courtesy of R. J. Berry

Tecopa R. R. #1 at Tecopa, Calif. circa 1934. Baldwin #34089, 11/1909.

Smith realized that further building towards Goldfield was impractical now that the LV&T and the B-G were an accomplished fact. The completed T&T line now was from Ludlow, Calif., to Gold Center, Nev.; 166.06 miles; the Pacific Borax Branch, Death Valley to Ryan, Calif., 6.98 miles; trackage rights over the B-G from Beatty to Goldfield, and Rhyolite, 3.79 miles. Total mileage operated, 180.85 miles. A joint T&T—B-G roundhouse was built at Beatty, Nev.

Merchants were happy with the coming of the new railroad. Not only were more people coming into the area, even weekend prospecting from Los Angeles, Calif., was a possibility. The most important factor making the mine operators and merchants happy was the fact that the T&T could become competitive with the LV&T on rates. An interesting comparison of the quoted freight rates appears in the following table:

The following were the freight rates from Los Angeles to Las Vegas:

CLASS	1	2	3	4	5	A	B
	1.84	1.75	1.46	1.28	1.08	1.86	.76

The following were the freight rates from Los Angeles to Beatty:

CLASS	1	2	3	4	5	A	B
	3.04	2.90	2.46	2.18	1.83	1.46	1.31

The following were the freight rates from San Francisco to Goldfield:

CLASS	1	2	3	4	5	A	B
	3.66	3.50	3.31	3.03	2.41	2.37	1.68

DECLINE

The first few years of this family of railroads were to be busy and profitable ones. Many passengers, machinery, ore and lumber shipments were traveling the rails. As today, the big revenue was from the freight shipments; and as new discoveries were made there was an upsurge in ore traffic, only to drop off again when the fields did not prove out. Such was the discovery of copper ore at Greenwater, California. This was to be the last of the "boom towns." So great was this find believed to be that mining engineers and experts were predicting that its output would far surpass the great copper mines of the Butte, Montana fame. Feverish activity took place; much jockeying between the Clarks, "Borax" Smith, Charles Schwab and other syndicates to buy the best claims. Some $4,000,000 was paid for a group of 2,500 claims. Senator Clark proposed building another railroad, the Tonopah & Greenwater, from the LV&T at Gold Center, Nev., to Greenwater. Before this could take place, the bubble burst. The ore was apparently just a thin shell and soon petered out. The town of Greenwater disappeared almost immediately.

The 1906 earthquake in San Francisco had the same disastrous effect of tumbling many of the mine corporations of the Nevada desert; many lost out on financial backing. Hard on the heels of the big labor strikes at the mines, came the panic of 1907. It took a couple of years for the

effect of the panic to reach the goldfields; but when it reached the West, many mines closed forever. One of the largest in the Rhyolite district was the Montgomery-Shoshone Mine. When it was discovered, the ore showed assays of up to $200,000 a ton, and was finally sold to Charles Schwab, ex-president of Bethlehem Steel Co., for $2,000,000. As the mines closed, one by one, the population of Rhyolite declined from a peak of 18,000 in 1908 to less than 1,000 in 1910. The final blow came with the closing of the Montgomery-Shoshone Mine. The city became deserted; and the rail service by the LV&T, T&T, and B-G. ceased. Rhyolite crumbled into ruins, and remains today, a well known "ghost town."

On June 11th, 1908 the Tonopah & Tidewater Company of Delaware was organized as a holding company, which acquired control and capital stock of the Tonopah & Tidewater and the Bullfrog-Goldfield Railroads. Altho the T&T and the B-G had the same directors and officers, the latter was maintained as a separate corporation. 1908 was one of the few years that the T&T, B-G made an entry in their profit columns; after which it was a steady deficit. The above arrangement continued until July 14th, 1914 when the Las Vegas & Tonopah R. R. gained control of the B-G thru acquisition of 51% of the road's capital stock. The LV&T reduced the B-G's outstanding stock to $1,640,000. Again, the B-G had a new set of officers and directors, the same as the LV&T, but it still was to continue as a separate corporation; the surplus of either operating company over fixed charges in any year was to be used to make up the deficiency of the other.

The year of 1914 showed the B-G back in the black again, but traffic was not sufficient to warrant two railroads to operate profitably between Beatty and Goldfield; particularly when these two roads closely paralleled each other for a considerable portion of the area. Permission was granted to the LV&T to abandon its trackage between Beatty and Goldfield and use the B-G trackage. The LV&T was shortened to 116 miles. This was to be a temporary relief; as revenues continued to decline thru the years. In 1917, in an effort to reduce further losses, Sen. Clark announced that daily train service was to be reduced to three round trips a week.

War clouds had reached to the United States, and by this time America's entry into W. W. I caused men and material to become scarce. The country's railroads were taken over by the U. S. Railroad Administration. Not all the lines were taken over apparently; mostly main lines, lines in good financial shape, and those lines believed to have the shortest routes between designated shipping points. The Railroad Act was to have dire consequences for many roads, long and short, and the LV&T was to feel its impact.

After "seizure" of the western roads, freight was routed over the shortest route in order to conserve manpower, fuel and equipment. The U. S. R. A. routing committee issued orders that all freight destined for the Tonopah area, from Los Angeles areas, be diverted over the Tonopah & Tidewater, thus cutting off whatever small revenue the Clark Road could eke out. About the same time the U. S. R. A. was conducting

a nation-wide survey on the feasibility of discontinuing "unnecessary" railroads. The principal objective was to release manpower and materials for use in other areas.

The time appeared ripe for the Clark Road to escape its annual losses. President J. Ross Clark quickly acted on October 14th, 1918 by stating that due to the loss of the freight revenues, the LV&T would discontinue service on October 31st, 1918. The populace of the affected counties of Nye and Clark, were not pleased at the prospect of losing their contact with the "outside world," except thru an extended out-of-the-way rail route to Las Vegas. It being an election year; presidential at that, one can conjure the certain political pressures were applied. In any event efforts were pressed to have the road taken over by the U. S. R. A.

The Nevada Railroad Commission acting on the line's request for abandonment, contacted the assistant director of the Railroad Administration regarding any action they would care to take. Somewhere suggestions were made that perhaps the LV&T could be considered a "branch" of the S. P. L. A. & S. L., which was under the administrator's rule; and thereby come under government operation. The problem was resolved; the Nevada Commission denied the road's abandonment request, and the government took over operations of the road on November 1st, 1918. However, this was not to last. Shortly after the Armistice; and the presidential elections, the road was returned to private ownership.

The critical shortage of rails and locomotives continued to push their prices upward. The LV&T again applied for abandonment. Loud cries of protest of the affected citizens was of no avail. Since the road had little or no revenue, and the rails and equipment would bring considerable profit; and there were no stockholders to object to the sale of the road; Governor Emmit D. Boyle was unable to prevent the closing of the LV&T from Las Vegas to Beatty, Nev.

It was reported that the road had some 12,000 tons of rail originally purchased for $30 a ton, that was sold; on the ground, for $60 a ton, for trans-shipment to the Orient. F. L. Botsford and Associates were in charge of dismantling the road; which began in February of 1919. All of the remaining cars and locomotives, save any held for taxes, were sold. The entire right of way, including some 55 small bridges, two water wells, pipe and assorted items were sold to the Nevada State Highway Department, thru a quit claim deed, for $3,829.44. Thus, the first railroad to reach the Beatty-Rhyolite areas was the first to be removed.

To provide some relief to the people and towns along the expired railroad, Senator Griffith's Senate Bill No. 22 was passed in 1918. The bill provided for several new sections of highway; one of which was State Route 5 commencing at Goldfield, going southeasterly to Beatty, thence over the grade of the LV&T to Las Vegas. An indication of the difficulties, due to climate and location of the highway, construction of the road was not completed until July 1st, 1924. Today, 1958, highway US 95 would bring a motorist over the substantial part of the long-gone LV&T.

Bullfrog-Goldfield attorney C. O. Whitmore declared that the B-G was nearly bankrupt, and suggested that the State of Nevada purchase the road's holdings in Nye and Esmeralda counties, but no action was taken. On December 8th 1919, Clark sold his holdings in the B-G to the T&T. Once again, the B-G came under T&T control, and once again its directors and officers were changed. The roads were still to be operated as separate companies, and the surpluses of one was to be used to make up the others deficits. Unfortunately there were no surpluses, only continuing deficits. In 1924 the State of Nevada reduced the B-G's assessment valuation from the 1923 figure of $3,746 a mile to $2,500 per mile. Still this did not provide enough aid to save the line. Its 1922 deficit was $24,701, and by 1923 it had climbed to $59,764, and no relief in sight. By 1927 the road was unable to continue in the face of rising deficits and the road applied for abandonment. Permission was granted and the B-G followed the LV&T into oblivion. The chain from Los Angeles, Calif., to Tonopah, Nev., was broken.

The Tonopah & Tidewater was also upon hard times. Steady declining revenues had raised its deficits to staggering proportions. New and larger deposits of borax were discovered at Boran, Calif., midway between Barstow and Mojave, Calif. So great is this deposit, that active mining of borax in Death Valley was discontinued. The neighboring Death Valley R. R. and the Tecopa Consolidated Mine R. R. quit. In addition, the depression of the thirties hits the line. The T&T abandoned its 31 miles of trackage from Ludlow to Crucero, Calif., severing its connection with the Santa Fe R. R. Traffic dwindled to a trickle, and soon there is but one mixed train a week over the line.

Lack of revenue provided no maintenance funds and the ever present desert flash floods soon played havoc with the roadbed. In 1939 the T&T petitioned the I. C. C. for permission to discontinue service. The federal body granted permission to suspend operations effective December 31, 1939, providing the rails and equipment remain for a future subsequent reactivation. The road laid dormant for almost two years; meanwhile the ravages of time and weather and flash floods were destroying the roadbed.

In September of 1941, a new lease of life was proposed for the Tonopah & Tidewater by Nevada Representative James G. Scrugham. It was to provide rail service for ore from the magnesium deposits at Luning, Nevada, to the refining plants at Las Vegas, Nev., by rebuilding the abandoned Bullfrog-Goldfield Railroad. Representative Scrugham and Gov. E. P. Carville conferred with officials of the Pacific Borax Consolidated Ltd., a British concern which had 99% of T&T's outstanding stock. Scrugham proposed that the T&T be taken over by the government, using lend-lease funds and the amount be credited to the British Govt. The same procedure would be used in the reconstruction of the B-G, with the Union Pacific, the main connecting railroad, operating the entire system.

Under the proposal no passenger equipment would be used on the ore route. Figures compiled by railroad engineers estimated the cost of

putting the line into operation would be $3,015,000. The breakdown was as follows:—

TONOPAH & TIDEWATER

Tie renewals 150,000 at $1.50	$225,000.
Strengthening bridges	20,000.
Locomotives	50,000.
Replacing 52 lb. rail with 65 lb. rail	20,000.
Total	$315,000.

BULLFROG-GOLDFIELD

Eighty miles of construction, at $30,000 per mile, included were the proportion of shop equipment, 1 locomotive, water tanks and telegraph lines. No passenger equipment included.	$2,400,000.
Railroad to salt deposits at Lake Meade, Nev., fifteen miles at $20,000 per mile	$300,000.

Representative Scrugham also pointed out that if ore was transported by trucks, it would mean at least fifty unloaded ones on the road between Luning and Las Vegas at all times. To construct a highway to carry such heavy traffic, the estimated minimum cost was $6,000,000, or about double that to build a rail line. Attention was also called to the fact that any highway built would necessitate maintenance by the state as well as a portion of the original construction outlay.

Unfortunately the plan was never put into effect. America was shortly to enter World War II. Once again, a railroad was sacrificed to the War Gods. The Government ordered the dormant T&T rails removed for war use elsewhere.

On July 21st, 1942 section crews arrived at Beatty, Nev., and immediately began removal of the rails; working towards Crucero, Calif. Even the abandoned Tecopa Railroad saddle tank engine No. 1 was hauled out as the wreckers progressed south. "Death Valley" Scotty, a legendary desert figure purchased miles of the ties, and had them hauled to his famous Death Valley Castle for firewood. It was not until 1945 that the T&T formally petitioned the ICC for abandonment; which was quickly granted—Farewell Tonopah & Tidewater.

History is now looking backward. Out of the desert group, there remains only the original Tonopah & Goldfield. With the Las Vegas & Tonopah, Bullfrog-Goldfield, and the Tonopah & Tidewater quitting, there did not seem much reason to continue operating. The depression had its ill effect on the T&G. Revenues continued to decline thru the years. The Tonopah Mining Company was still the railroad's largest shipper of ore, but the shipments were not earning the road any great profit; little money was left from operating expenses to provide adequate equipment and roadbed maintenance; the road was literally falling apart.

The same demand for rails and scrap, that spelled the end of the Tonopah & Tidewater, was to be felt on the T&G. On November 26th, 1940 a minority group of stockholders, led by William W. Fogarty, of the W. W. Fogarty & Co., Philadelphia brokerage house and others who claimed to have 25% of the stock, filed suit in Federal Court at Carson

City, Nevada, to have a receiver appointed to bring about the abandonment and liquidation of the railroad. The complaint asserted that the railroad had sustained operating losses in excess of $1,000 a month. Passenger service produced no operating revenue, most freight operations were carried as a net loss; no prospect that the road could be operated at a profit.

The value at which the railroad could be liquidated was dependent upon whether its rails and other comparable assets could be disposed of, at the then currently prevailing prices of scrap metals, it was claimed. Postponement of liquidation, it was held, would impair the equities of the complainants, without justification. The company stock had a sound asset value of $20 per share without calculation of the road and equipment; the estimated value of which was $3,391,327.41 with the exception of the scrap metal value of the rails. It was expected that the liquidating price of the shares would exceed $30.

However, Federal Judge Frank H. Norcross granted a motion to dismiss the suit in August of 1941. The following year, 1942, the railroad was sold to a salvage firm headed by the Dullien interests. The road was not junked, but continued to operate. After America's entry into W. W. II, an Air Base was established at Tonopah. At last the traffic became great enough for the road to again show a profit. Altho the Air Base brought considerable business, the road petitioned for abandonment on March 3rd, 1943. The request was denied principally because the Army base needed the rail service; so the road pushed on.

Allied Victory in 1945 brought a halt to manpower training and war goods shipments; the Tonopah Air Base was all but deactivated. In early 1946, the T&G sought permission to curtail its services. It requested elimination of passenger service, pickup and delivery service on less-than-carload freight, and discontinuance of scheduled freight service. By this time the steam locomotives were being laid up, one by one, for lack of repairs; and no money was available for the necessary work. Train service had dwindled to one train a day. Still, it became necessary to lease two U. S. Army Transportation Corps diesels to provide this meager service.

Unfortunately the diesel locomotives were recalled by the Government on September 18th, 1946. Faced with the loss of motive power, the Tonopah & Tidewater filed its application for abandonment the same day. T&G attorney, Captain Walter Rowson set noon October 1st, 1947 as the date for embargo of freight to Tonopah, would be effective. At that, there remained a few freight cars on the line, which were removed by the line's gas buggy.

A stormy hearing was held in Reno, in October of 1946, on the roads abandonment request. Lack of revenue, deteriorating roadbed, no serviceable motive power, and adequate existing alternate transportation facilities, were factors argued for closing the road. The I. C. C. granted permission for the T&G to cease operations, but the Nevada State Public Utilities denied the roads request. It was not until Federal Courts intervened, that the road was allowed to die.

Dismantling of the Tonopah & Goldfield began in March of 1948. The wreckers were plagued by several mishaps and delays. On March 14th, the wrecking company's diesel engine ran thru an open switch and crashed into several boxcars, sustaining extensive damage. The removal job was delayed for several weeks, until the locomotive could be repaired. As a last defiance—on April 9th, 1948, one of the steam engines being cut for scrap caught fire and burned for several hours. So, up in smoke went the dreams of a once proud desert rail empire.

CONNECTING RAILROADS

Silver Peak Railroad (6)

The Silver Peak railroad was incorporated June 20th, 1906 under the laws of Nevada, to build a standard gauge line from Tonopah & Goldfield's Blair Jct. to Blair, Nevada, a distance of 17.5 miles. The road was owned and operated by the Pittsburgh Silver Peak Gold Mine Company. Capital stock authorized and outstanding, $200,000.

Directors: M. L. Effinger, R. J. Watson, C. J. Blumenthal, E. B. Cushman, Geo. Bartlett, H. W. Clarke, H. S. Crockett, J. H. Monteath, C. M. Hobbs, L. A. Parkhurst.

Officers: E. B. Cushman, Pres.; Geo. Bartlett, Vice Pres.; M. L. Effinger, Sec. & Treas.; A. J. G. Logan, Chief Engineer.

The seventeen and one half miles of trackage were purchased from the Tonopah & Goldfield after it had been standard gauged. Construction began immediately and by August 10th, 1906 the graders were half way to Blair. Work progressed rapidly, and by October 11th, the first construction train pulled into the camp at Silver Peak, amid many glad "toot toot's" of the locomotive whistle. On October 23rd, the official opening special brought in the rail officials and the Chas. M. Schwab interests, on the private car "Plymouth Rock."

Equipment consisted of two 4-4-0's, probably ex Southern Pacific, and, at its peak, 20 freight cars. Road had an up and down revenue history, and managed to wind up with a deficit of approximately $260,000; when operations ceased about 1916, after ore deposits were worked out.

Last officers appear to be the following: G. T. Oliver, Pres.; Wm. A. Bradley, Vice Pres.; B. A. Rines, Sec. & Treas. and Gen. Freight & Passenger Agent.

Death Valley Railroad (7)

Incorporated on January 26th, 1914, under the laws of California to build a narrow gauge, (3') railroad from Biddy McCarty Jct., to the Biddy McCarty Mines at Devair, Calif.; 16.95 miles and eventually from Ryan to the Death Valley Jct. on the Tonopah & Tidewater R. R., a total distance of 20.35 miles. Capital stock authorized and outstanding, $118,900. Controlled by the Pacific Coast Borax Co. Ltd. Directors and officers were identical to the Tonopah & Tidewater R. R., as the road was operated in conjunction with the T&T and B-G.

The railroad's early operation showed a profit and a dividend of 4½% was declared in 1915 and a 25% dividend in 1916, but none since.

Operations ceased in the late 1920's after discovery of larger and better borax deposits at Boran, California. The line's two locomotives and dozen ore cars were sold to the United States Potash Company at Carlsbad, New Mexico. Engine No. 2 was returned, in 1956, to the Death Valley Inn and set up on display.

Tecopa Railroad (8)

A ten mile standard gauge railroad opened in 1910 to serve the Tecopa Consolidated Mine with a connection with the Tonopah & Tidewater R. R. at Tecopa, Calif. Operations ceased in the early 1930's. Motive power was one 2-6-2 saddle tank locomotive.

Ludlow & Southern Railroad (9)

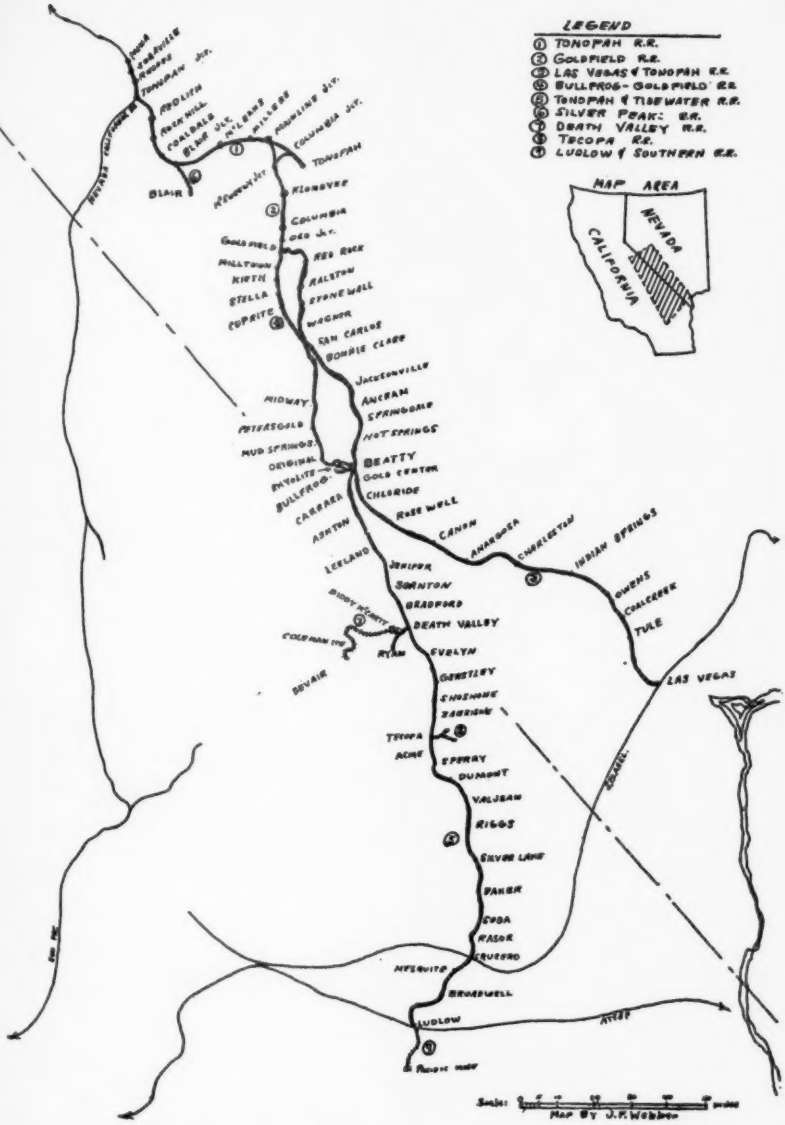
A standard gauge line from Ludlow, Calif. to Steadman, Calif., 7.19 miles. Owned and operated by the Pacific Mines Corp. as a switching road. Motive power consisted of second hand Tonopah & Goldfield engines, as noted in the roster data. Operations ceased in the early 1930's. Officers listed for 1907 were: B. E. Chase, Pres.; J. H. Steadman, Vice Pres.; Chas. Wier, Sec.; W. Darlington, Treas. & Gen. Mgr.

Tonopah & Goldfield R. R.

1	0-6-0	Baldwin	#25124	2/1905	— Ex Tonopah #10. Sl Shannon Bros. for Ludlow & Southern #1
2	0-6-0	Baldwin	#25125	2/1905	— Ex Goldfield R R #3—Scr at Goldfield
10	4-6-0	Baldwin	#25269	3/1905	— Ex Goldfield R R #1—Scr at Goldfield
11	4-6-0	Baldwin	#25234	3/1905	— Ex Tonopah #5—Scr at Goldfield
12	4-6-0	Baldwin	#25235	3/1905	— Ex Tonopah #6—Scr at Goldfield
50	2-8-0	Baldwin	#25233	3/1905	— Ex Goldfield R. R. #2—Scr 1948
51	2-8-0	Baldwin	#25141	2/1905	— Ex Tonopah #7—Scr 1940
52	2-8-0	Baldwin	#25169	2/1905	— Ex Tonopah #8—Scr 1948
53	2-8-0	Baldwin	#25183	2/1905	— Ex Tonopah #9—Scr 1940
56	2-8-0	Baldwin	#31690	9/1907	—Scr 1948
57	2-8-0	Baldwin	#31728	9/1907	—Scr 1948
100	2-8-0	Baldwin	#30761	5/1907	— Sl Red River Lbr. Co. #100—1914
101	2-8-0	Baldwin	#30686	5/1907	— Sl Red River Lbr Co. #101—1914
102	2-8-0	Baldwin	#30734	5/1907	— Sl Red River Lbr. Co. #102—1914
269	2-8-0	Brooks	#26469	1/1903	— Orig BR&P #269; Chicago Attica & Sou #269; Acq. from CA&S 4/1945—Scr. 1948
2nd 11	2-8-2	Baldwin	#41299	4/1914	— Orig. Mason County Logg. Co. #9; Carlton & Coast #11. Acq. 4/1945—Scr 1948
2nd 53	2-8-0	Baldwin	#31750	9/1907	— Ex Tonopah & Tidewater #7. Acq. 1944—Scr 1948

Narrow (3 ft) Gauge

Tonopah R R					
1	4-4-0	Baldwin			— Leased from Nevada & Calif. in 1903 and returned in 1905
2	2-6-0	Baldwin	#19211	7/1901	— Ex Chateaugay R R #16. Sl Sumpter Valley #2—1905
3	2-6-0	Baldwin	#19210	7/1901	— Ex Chateaugay R R #15. Sl Sumpter Valley #1—1905
4	2-6-0	Baldwin	#24689	9/1904	— Pur new. Sl Sumpter Valley #4—12/1905



Map of the Goldfield Railroad, drawn by the author.

Standard Gauge

USA 8015-6 DES Schenectady 70636-7 1942 — Leased from USA Transportation Corps in 1947, recalled 10/1947

M-103 Gas Electric Coach

Locomotives of the Las Vegas & Tonopah R. R.

1	4-6-0	Bldw.	5/91	#11867					See Note A
2	4-6-0	Bldw.	9/91	#12204					See Note B
3	0-6-0	Bldw.	11/06	#29712					See Note C
4	4-6-0	Bldw.	2/07	#30105	21x26-57	178400	34190	200#	See Note D
5	4-6-0	Bldw.	2/07	#30106	21x26-57	178400	34190	200#	See Note E
6	4-6-0	Bldw.	2/07	#30107	21x26-57	178400	34190	200#	See Note F
7	4-6-0	Bldw.	6/07	#31093	21x26-57	178400	34190	200#	See Note G
8	4-6-0	Bldw.	6/07	#31094	21x26-57	178400	34190	200#	See Note H
9	4-6-0	Bldw.	11/07	#32250	21x26-57	178400	34190	200#	See Note I
10	4-6-0	Bldw.	11/07	#32251	21x26-57	178400	34190	200#	See Note J
11	4-6-0	Bldw.	12/07	#32360	21x26-57	178400	34190	200#	See Note K
12	4-6-0	Schen.	/07	#44753	21x28-63	188600	31640	190#	See Note L
30	2-8-0	Brks.	/07	#44750	22x30-57	220500	43308	200#	See Note M
31	2-8-0	Brks.	/07	#44751	22x30-57	220500	43308	200#	See Note M
32	2-8-0	Brks.	/07	#44752	22x30-57	220500	43308	200#	See Note M

Notes

A Orig. Los Angeles Terminal RR #5, Ex SPLA&SL #50, Ex LA&SL #50, Acq. 1906, sold to Outer Harbor Terminal Ry #1; Scrapped.
B Orig. Los Angeles Terminal RR #7, Ex SPLA&SL #51, Ex LA&SL #51, Acq. 1906, sold to Nevada Copper Belt RR #1. Scrapped 1916.
C Orig. Bullfrog-Goldfield #3, Acq. 1907, sold to Ludlow & Southern #3, to Utah Ore Co. #3.
D Sold to North Western Pacific RR #170; scrapped.
E Sold to North Western Pacific RR #171; scrapped 1946.
F Stored in a shed at Las Vegas, on account of unpaid taxes; sold 1931 to the Six Companies #7107, at Boulder Dam, Nevada. Scrapped 1937.
G Sold to San Diego & Arizona Eastern #24; Scrapped.
H Sold to North Western Pacific RR #172; scrapped 1948.
I Sold to San Diego & Arizona Eastern RR #25; scrapped.
J Sold to San Diego & Arizona Eastern #26, to Southern Pacific #2386, to SD&AE #26, scrapped 1951.
K Sold to San Diego & Arizona Eastern #27; scrapped.
L Sold to North Western Pacific RR #129, 179; scrapped.
M Sold to Los Angeles & Salt Lake RR #'s 3675-3677, to Union Pacific #'s 6084-86; scrapped.

Locomotives of the Bullfrog-Goldfield R. R.

3	0-6-0	Bldw.	11/06	#29712					See Note A
4	0-6-0	Bldw.	11/06	#29713					See Note B
11	4-6-0	Bldw.	11/06	#29726	21x28-63	162000	31650	190#	See Note C
12	4-6-0	Bldw.	11/06	#29727	21x28-63	162000	31650	190#	See Note D
13	4-6-0	Bldw.	11/06	#29726	21x28-63	162000	31650	190#	See Note C
14	4-6-0	Bldw.	11/06	#29727	21x28-63	162000	31650	190#	See Note D
54	2-8-0	Bldw.	10/06	#29265					
55	2-8-0	Bldw.	10/06	#29266					

Notes

A Sold to Las Vegas & Tonopah #3, Sold to Ludlow & Southern #3, Sold to Utah Ore Co. #3.
B Sold to Peninsular Terminal #401.
C #13 renumbered #11; sold to North Western Pacific #178, scrapped.
D #12 renumbered #14; sold to San Diego & Arizona Eastern #20, to Southern Pacific #2385, to San Diego & Arizona Eastern #20; scrapped.

Locomotives of the Tonopah & Tidewater R. R.

1	4-6-0	Bldw.	9/95	#14418	19x24-63	124690	21000	180#	See Note A
2	2-6-0	Dickson	1883	#454	19x24-51				See Note B
3	Vacant								
4	2-6-0	Bldw.	10/06	#29312	18x24-50	112000	21400	180#	See Note C
5	2-8-0	Bldw.	8/07	#31418	20x24-50	142000	29200	180#	See Note D
6	2-8-0	Bldw.	8/07	#31419	20x24-50	142000	29200	180#	See Note E
7	2-8-0	Bldw.	9/07	#31750	22x28-55	183800	37690	180#	See Note F
8	2-8-0	Bldw.	9/07	#31791	22x28-55	183000	37690	180#	See Note G
9	4-6-0	Bldw.	11/07	#32292	19x26-63	146500	25325	200#	See Note H
10	4-6-0	Bldw.	11/07	#32293	19x26-63	146500	25325	200#	See Note H
99	Gas-Electric Passenger Coach								

Supposedly had a switcher, #13, so badly worn that it was never used.

Notes

A Orig. Randsburg RR #1, Ex Wisconsin & Michigan 1st #8, Ex AT&SFe 641, 856, 260. Acq. 1906, scrapped 1941.
B Orig. Delaware, Lackawana & Western #161, 85, 671; scrapped.
C Sold, 1913, to Santa Maria Valley #2, 12; scrapped 1940.
D Sold, 1913, to Santa Maria Valley 2nd #1, 15; scrapped 1933.
E Sold to Pacific Portland Cement Co. #6; scrapped.
F Sold, 1944, to Tonopah & Goldfield 2nd #53; scrapped 4/1948.
G Sold to Kaiser Steel Co., Fontana, Calif.; rebuilt to an 0-8-0; scrapped.
H Sold to Morris-Knudson Co. #'s 9-10; scrapped 1946.

Locomotives of the Silver Peak R. R.

1	4-4-0	Cooke #2076	1891	Ex OSL 642; Orig UP 1470; ret OSL 11/1909 in exchange for #2. Became OSL 642—UP 1529
2	4-4-0	Baldwin #8372	1887	Ex OSL 301; Orig UP 727. Acq. 11/1909 Scr by United Commercial Co., S. F., Cal. 1922

Locomotives of the Death Valley R. R. (3')

1	2-8-0	Bldw.	6/14	#41473	See Note A
2	2-8-0	Bldw.	2/16	#42864	See Note A

Notes

A 1 & 2 Sold to United States Potash Co. #'s 1-2, at Carlsbad, New Mex. Engine #2 was returned to Death Valley, Calif., in 1956 and set up for display at Furnace Creek Ranch.

Locomotive of the Tecopa R. R.

1 2-6-2T Bldw. 11/09 #34089

Abandoned at Tecopa, Calif., 1932 to 1942. Brought to Crucero, Calif., when the Tonopah & Tidewater was dismantled. Eventually scrapped by the AT&SFe, 1946, at Barstow, Calif.

Locomotives of the Ludlow & Southern R. R.

1	0-6-0	Bldw.	2/05	#25124	See Note A
--	4-6-0	Mech. Drive	Pacific Mine Co.?, 19—		See Note B
3	0-6-0	Bldw.	11/06	#29712	See Note C

Notes

A Orig. Tonopah & Goldfield #10; lettered "Tonopah & Goldfield."
B Machinery from Tonopah & Goldfield narrow gauge engines #'s 1, 5 or 6.
C Orig. Bullfrog-Goldfield #3, Ex Las Vegas & Tonopah #3, to Utah Ore Co. #3.

Bibliography

The writer is indebted to the following people and sources who made the preceding article possible:

Photos— Richard J. Berry
G. M. Best
R. C. Gray
Henry E. Huntington Library & Art Gallery, San Marino, Calif.

Other Sources—Nevada Historical Society
Nevada State Historical Museum
Nevada State Library
State Department of Nevada
Reno Evening Gazette
Beatty-Bullfrog Miner
Tonopah Sun
Poor's Manual of Railroads
U. S. Geological Survey Maps

Editor's Note:

Since closing his paper, the author wishes to call the attention of our membership to the fact the Goldfield Consolidated Mining Co. operated a railroad 7/8 of a mile in length from the north of Goldfield with connections with the L. V. & T. at Columbia, Nevada and with the T & G—Bullfrog-Goldfield at Goldfield, Nevada. No date of its incorporation or its demise has been discovered. The road owned one locomotive, the No. 1, 0-6-0T, Baldwin, #32804, 6/1908, 15x24″ 44″ and at least five hopper type ore cars numbered one through five.

"Fat Annie"—Pioneer 'Pennsy' Pacific

By Frederick Westing

Back in 1906 big things were stirring in American railroading. Business was booming and passenger and freight traffic was jamming the tracks throughout the country. Trains were getting bigger and to keep pace with this state of affairs, locomotives likewise showed a tendency towards increased size.

A railroad as big as the Pennsylvania was bound to be affected by such conditions, and so the year 1906 became something of historical import in the development of the Company's motive power.

At that time on the northwest route of the Pennsylvania's Lines West, between Pittsburgh and Chicago, the weight of passenger trains had increased to a point that severely taxed the road's Atlantic type locomotives. These engines, of which class E3D stood as the most recent representative, could with suitable loads, say up to 8 wooden cars, perform very well. But loads had been steadily getting past the suitable stage with 10, 12 and even more cars in a train, and doubleheading was resorted to more and more. While the Pennsy's mountain grades are well known, there are some severe grades on the northwest system that take it out of a locomotive, especially when overloaded. Continued doubleheading or possibility of cutting passenger trains in half could not be condoned with equanimity, and the idea of a larger locomotive to take over looked like just the right answer.

The situation was further aggravated by the portending use of all steel passenger cars on the Pennsylvania, proclaimed by an official edict in 1906, stating that thenceforth, all passenger cars were to be built wholly of steel. Notice was also served on the Pullman Company that their cars, as far as Pennsy operation was concerned, would have to conform to this form of construction. The Pennsylvania's project of a direct rail entrance into New York City, then under way, was the motivating influence behind the steel car policy and its effect was far reaching.

Here we have locomotives encountering difficulty in meeting existing schedules with wooden car trains, and then, heavier cars of steel, plus longer and heavier trains were to become realities. Couple this to the anticipation of speedier schedules for certain trains, and it can be appreciated what a locomotive was up against.

Inasmuch as this problem was more pressing on the northwest system, it was felt to be the responsibility of the General Superintendent of Motive Power, Lines West, David F. Crawford, with headquarters at Pittsburgh. Mr. Crawford was a man of great ability in locomotive matters and known for his progressive attitude. He was an early advocate for the automatic stoker and produced one of his own that did a remarkably good job with hundreds of them applied to Pennsylvania Railroad locomotives. He was a member of the locomotive committee that came up with one of the finest locomotives built, the DD-1 electrics of

New York Tunnel and Terminal fame. Finally, he became General Manager of the Lines West, and later left the Pennsylvania to become a top-ranking official in the Locomotive Stoker Company.

Wisely, Crawford enlisted the aid of the Pittsburgh Works of the American Locomotive Company in attempting the solution of his problem. Usually designs of locomotives emanated from Altoona, but at the time the road's motive power headquarters in the mountain city were literally swamped with work. They were collaborating with the Westinghouse people in the development of the electric locomotive upon which the success of the huge New York project depended in great part. The mechanical engineer's office was working out new designs for the all-steel passenger cars, and the big freight Consolidation type locomotive of class H8 was being detailed on the drawing board. It, therefore, made good sense to enlist the aid of an outside builder, and the closeness of the Pittsburgh Works made it easier for Mr. Crawford to give his personal attention to the detailed design of the proposed engine.

This was in the days before extensive superheating and the best and quickest solution seemed to be the creation of a larger locomotive. This usually worked, and it was decided to select that new 4-6-2 Pacific type which some of the western and southern railroads were using so successfully.

The Pacific's big advantage was its greater adhesion, that is, its weight on the driving wheels, or "pulling weight," and a larger boiler with a two-wheeled trailing truck that allowed a deep firebox—an important point in a bituminous coal-burning locomotive. This was not, however, the Pennsy's first use of a six-coupled locomotive using a trailing truck. Just the year before, in 1905, it had purchased two Prairie (2-6-2) type engines from Alco's Schenectady plant, numbered 2761 and 7453 for service on the road east and west of Pittsburgh respectively. These engines, designated as class J28, were closely patterned after the high-stepping Alco Prairies built for the Lake Shore & Michigan Southern Railway.

The J28's had more driver weight than the Pennsy's E3 sub-class Atlantics, but exceeded them in tractive force by only 110 pounds. Like other roads the Pennsy found the leading two-wheel pony truck a tricky item in high-speed service, and with the Prairies costing more to build and service, their subsitution for the Atlantics appeared impractical. Nevertheless, these two engines gave a good account of themselves and worked out a fairly long life. The 7453 had Stephenson valve gear but the 2761 seems to have the distinction of being the first Pennsylvania Railroad passenger locomotive to have Walschaerts valve gear with piston valve cylinders.

As a result of the collaboration between Mr. Crawford and the Pittsburgh Works, there was outshopped in April 1907, an exceptionally big Pacific bearing Alco construction number 41,525. In point of size it was said to be the largest passenger locomotive in the world, and its largely widened boiler with the noticeably and necessarily shortened domes and stack, foretold the shape of things to come in Pennsy locomo-

tives. Known as class K28, it carried road number 7067, formerly held by an old Lines West H1 class Consolidation.

The boiler was of the straight-top type made up of three telescopic shell sections that measured 79-¾ inches in diameter at the smokebox and 83-¼ inches at the dome course. Its firebox of the round-top, or radial stay style, departed from the Pennsy's usual Belpaire pattern, and 343 boiler tubes 21 feet long and 2-¼ inches wide gave a total heating surface of 4,427 square feet, including firebox surface. Saturated (non-superheated) steam was fed to the cylinders from the throttle valve located in the shortened steam dome.

A grate area of 68.8 square feet gave No. 7067 the largest grate of any passenger engine on record burning soft coal. Water was delivered to the boiler through the road's usual arrangement of an internal pipe fed from a double check valve chamber on the backhead, and passed into the boiler near the front tube sheet. Coal was fired through a single firedoor 20 inches wide.

Four plates, or waistsheets (belly braces) supported the boiler between the cylinders and the firebox, and by a sliding support at the front end of the firebox and a deep plate at the rear.

Placing such a huge boiler on a frame carried by 80-inch drivers caused quite a raising of the boiler's centerline and brought the top of the boiler shell to a height that necessitated the skyline items of stack and domes to be whittled down greatly. The bell, together with the whistle, had to be placed off to one side and inclined diagonally to keep within clearance limits.

The cylinders, valve chests and saddle, were cast in two halves and then bolted together as one piece. Liberal sized steam passages of easy curves lessened steam flow obstruction and allowed a plentiful supply to feed the two 24 by 26 inch cylinders at high speed. Steam was admitted to the center of each valve chest which were offset four inches from the cylinder centerline to keep the Walschaerts valve gear in one plane. The built-up piston valves of the inside admission type, and said to be the largest ever applied to a locomotive, measured 16 inches in diameter at the heads.

A specially designed outside frame supported the Walschaerts gear link and reversing shaft on both sides of the locomotive, and also was arranged to keep the gear in a straight line, or plane. This link supporting frame extended from the guide yoke to a cross brace just in back of the first pair of drivers. It consisted of two cast steel channel section bars, on which rested the bearings for the trunnion of the link which extended downward between the two bars. Connection of the radius bar to the reverse shaft was made through a slip joint. The reach rod connected directly to the vertical arm of the reverse shaft and had a bearing on the side of the firebox just back of which was a hinged joint from which a short section connected directly to a hand operated reverse lever.

Great care went into the designing of the main frames which were of the bar type of cast steel with generously wide upper and lower rail sections substantially strengthened by heavy crossbracing at three points.

Broad cast steel plates were secured between the upper and lower frame rails at two points in the main frame, one being over the front pedestal and the other between the second and third pair of drivers. There were also several crossties, binding the lower rails together, as well as a heavy crossbar at the front end of the firebox.

A radial type trailing truck with a pair of 54-inch wheels supported 49,475 pounds. It was formed of a heavy box and yoke casting to which the cross piece and 75 inch radius bar were riveted. The trailing truck was hinged at the forward end and held by a spring centering device in the rear. To this frame were applied journal boxes and on their tops were arranged grooves for rollers, with the centerline of the rollers radial to the truck movement. Above the rollers was a cap or spring seat having similar grooves on its lower surface. The "Y" shaped pieces spanning the springs acted as guides and prevented any side motion of the spring or cap. In fact, the trailing truck and back-end framing of Fat Annie was just about a duplicate of that used on the J28 class Prairie type engines.

The equalizing system was continued for the three drivers and trailing truck on each side of the locomotive. The springs were mounted above the frames over the boxes in every case and were secured to an equalizer located between the frame rails by hangers spanning the frames. Connection to the trailing truck was made by a long equalizer set diagonally so as to connect to the outside spring of the trailer and to the back of the spring over the rear driver, the front hanger being inside the frames.

A tender of standard design used by the Atlantics on the Lines West with two four-wheel trucks was used. It had a capacity of 7,000 gallons of water and 11 tons of coal.

Shortly after engine 7067 took to the road her daily performance became a thing of great importance to all associated with her operation. It was the only engine of its kind on the road, and of such mammoth proportions, especially the expanded boiler girth, that she soon received the name—albeit affectionately—of "Fat Annie." Her extreme width measured over the running boards was 10 feet 3½ inches.

From the start "Fat Annie" was popular with the engine crews. She steamed freely and the firemen had no trouble keeping her hot over a division. She was also easy riding and for such a big locomotive rode quietly.

Her operation was closely checked officially for if the engine proved successful duplicates would be forthcoming and it was desirable to flatten out kinks that might arise and not carry them along with any of "Fat Annie's" progeny.

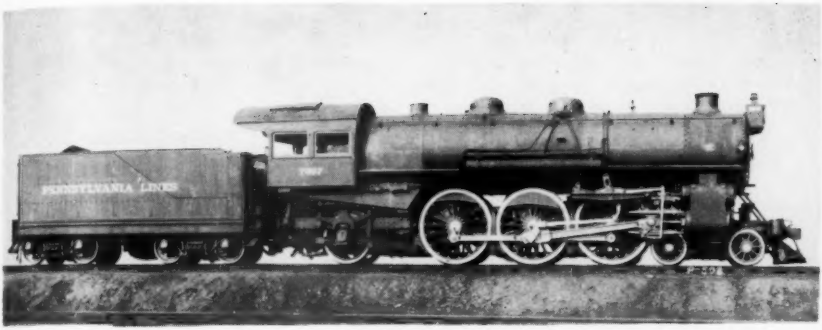
Most of the running of engine 7067 was done between Pittsburgh and Crestline, Ohio, on the Fort Wayne line to Chicago, and the trains prominently involved were Numbers 403 and 8. Train 403 ran from Pittsburgh to Crestline and was something of a "fast local" making 15 stops in the 188.7 mile run and usually hauling 11 cars. The run called for a schedule timing of 4 hours and 40 minutes, which averaged about 43 miles-an-hour. With the many stops this called for quite high

speeds between them and demanded rapid acceleration with heavy loads. From Crestline to Pittsburgh, "Fat Annie" returned with train No. 8, the Chicago to New York Atlantic Express, which was somewhat heavier and took 6 hours with 13 stops, averaging 31.4 miles-an-hour with station stops included.

The following table tells the story of "Fat Annie's" work with trains 403 and 8, for the whole month of August 1909:

Month of August 1909

Date	Train No.	No. Cars	Time Lost, Mins.	Time Made Up, Mins.
1	403	11	None	Made Schedule Time
1	8	11	None	Made Schedule Time
2	403	9	None	22
2	8	11	None	5
3	403	10	None	16
3	8	13	None	24
4	403	11	None	42
4	8	11	None	Made Schedule Time
5	403	10	None	16
5	24	11	None	Made Schedule Time
6				Did Not Run
6				Did Not Run
7	403	11	None	10
7	8	12	None	Made Schedule Time
8	403	8	80	Due to Broken Tender Wheel
8	8	11	None	45
9				In Shop, Tender Wheels
9				In Shop, Tender Wheels
10	403	10	None	24
10	8	11	None	74
11	403	10	None	32
11	8	11	None	Made Schedule Time
12	403	10	None	18
12	8	11	None	18
13	403	12	None	32
13	8	12	None	Made Schedule Time
14	403	11	None	11
14	8	13	None	38
15	403	10	None	14
15	8	11	None	14
16	403	9	None	12
16	8	11	None	Made Schedule Time
17				In Shop, Locomotive Truck Wheel
17				In Shop, Locomotive Truck Wheel
18	403	10	None	18
18	8	12	None	33
19	403	11	None	40
19	8	13	None	64
20	403	12	None	3
20	8	12	None	10
21	403	11	None	12
21	8	12	None	20
22	403	10	None	31
22	8	12	None	Made Schedule Time
23	403	9	None	19
23	8	11	None	20
24	403	11	None	8



Pennsylvania Lines #7067, Pittsburgh, 1907, K-28.

Courtesy of C. E. Fisher

P. R. R. #1396 at West Philadelphia. Juniata Shops, 1910, K-2.

24	8	12	None	47
25	403	11	None	5
25	8	12	None	26
26	403	11	None	18
26	8	13	None	16
27	403	11	None	14
27	8	12	None	33
28	403	9	None	51
28	8	13	None	33
29	403	11	None	16
29	8	12	None	34
30	403	10	None	11
30	8	9	None	32
31	403	11	None	22
31	8	10	None	63

Here is another record of engine 7067 taken between August 1, 1907, and January 1, 1909, which shows how well she stood up during the heavy pressure of exceptional tasks in rugged railroading.

Performance of Locomotive 7067 in Passenger Service

Made time	133 trips	21.6 per cent
Made up time	446 trips	72.5 per cent
Lost time	36 trips	5.9 per cent
Total number of trips	615	
Total mileage		117,137

Detentions due to

Not steaming	10
Hot driving boxes	10
Hot crank pins	1
Injector failure	1
Pump failure (air compressor)	2
Loose wedges	1
Steam hose	1
Taking coal	1
Flues leaking	1
Gage cocks leaking	1
Lap and lead lever broken	1
Spring hanger broken	1
Piston rod broken	1
Coupler knuckle broken	1
Tender wheel broken	1
Transmission bar broken	1
Main driving axle broken	1
Total detentions	36

No doubt about it, the big K28 after plenty of "screening" had proved its point: it could efficiently handle existing train loads and those contemplated for some time ahead. An alternative design originated by Alfred W. Gibbs, General Superintendent of Motive Power, at Altoona, had been prepared and given a K1 class designation. It looked promising and might well have turned out to be as successful as the K28, but the K28's ability was already known and all its details down in black and white ready to be manufactured without needing the addi-

tional time required to check-out kinks that might have turned up in the K1—as yet unbuilt. And that was the clincher, time was short—much too short! For by then not only did the Lines West need a more powerful locomotive but from east of Pittsburgh where the steady infiltration of all-steel passenger cars was making itself felt, the clamor rose for bigger power—and fast!

So in 1909, "Fat Annie" was revamped to the more orthodox contours associated with Pennsy locomotives. This took place in the drawing room at the Fort Wayne shops in Indiana, and the K28 was reborn as class K2. In this newer version that old standby, the Belpaire firebox again came into its own, while straight-line running boards and relocated air drums did much to enhance external lines. Basically, however, the vital proportions of No. 7067 were retained as were most other details. A comparative viewing of a picture of "Fat Annie" and a K2 readily shows the close similarity between them.

Early in 1910, even before the opening of New York's Penn Station, the Juniata Shops began to turn out class K2 engines for service both east and west of Pittsburgh. At the end of 1910 the Pennsylvania came out with Alfred W. Gibbs' class E6 Atlantic, successor to the smaller boilered variety of that type. But this time Altoona and the famous testing plant pushed the development in person, and came up with the E6S engines of 1914 that set the railroad world back on its heels.

Nevertheless, as a successful stop gap the K2's were all right, and for many years they did well—especially after 1912 when many were superheated. James T. Wallis, former Pennsy Motive Power Chief, informed the writer that the K2S engines had all given good service. The Pennsylvania certainly got their mileage from them, and while disparaging remarks have been made about the class, this could possibly have stemmed from "home team fervor" as the K2's were not an original Pennsy design but based upon an Alco or outsider's locomotive.

Another good group of Pacific type locomotives built between 1910 and 1913 by Alco for the old Vandalia Line of the Pennsylvania, was based directly on "Fat Annie." These were originally the VK-1's later superheated and known as class K21S. An interesting account of these and other Vandalia engines by your Society's President Mr. Chas. E. Fisher appeared in Bulletin No. 92.

A Pacific of huge proportions was built by Alco in 1911, but this engine, No. 3395, class K29s, represented a new approach and had no direct connection with No. 7067. It did, however, provide some basic dimensions for that Pacific of Pacifics, the K4 class. In 1913, The Baldwin Locomotive Works built 30 superheated Pacific type locomotives for the Lines West known as class K3S. They duplicated class K2 with the exception of the cylinders which on class K3 were 26x26 inches, a size recommended by Mr. A. W. Gibbs for his proposed K1. Like the K2's on Lines West they were fired by Crawford automatic stokers which had the reputation of producing almost smokeless combustion—a thing well appreciated and welcomed in the Pittsburgh area.

Yes, "Fat Annie" sure sold the Pacific to the Pennsylvania Railroad, and her direct descendants of classes K2, K3 and K21, earned

many a revenue dollar for the road. On October 10, 1916, No. 7067 was equipped with a superheater and became class K28S, and in June 1933, was cut up for scrap. She had had her day, and in it had proved that "Fat Annie" was quite a girl.

Table of Specifications for Classes K28 and K2

Class	K28	K2
Year Built	1907	1910
Cylinders, inches	24 x 26	24 x 26
Drivers, diameter, inches	80	80
Steam pressure, lbs.	205	205
Grate area, square feet	61.86	55.38
Heating surface, total, sq. inches	4,427	4,629
Boiler diameter, min. internal, inches	78	78
Weight on drivers, lbs.	173,550	185,900
Weight, total engine, lbs.	269,200	278,800
Tractive force, lbs.	32,620	32,620

Passenger Locomotives. British vs. American

A GLANCE AT THE '90s

By Fred Jukes

To you who have followed the development of the American steam locomotive from the days of its transition from "diamond" to "straight" stack, more particularly the late eighties and through the nineties, this sketch is dedicated.

From 1900 to 1950 the reciprocating steam locomotive had gone through the period of its greatest development, both as to size and efficiency. In this, its last stage, still essentially a direct descendant of George Stephenson's "Rocket," it could go no further due to limits imposed on it by the loading gauge. We are to deal with the period just before this.

For some years after its appearance the British locomotive was in the forefront because of its superior design and workmanship. America, though not yet a manufacturing nation, almost from the start showed signs of wanting to break away from British tradition. Many of its earliest locomotives were, of necessity, copies of the more successful examples from the other side but, one by one, features which we may call American began to creep in. The plate frame was discarded and the more open bar frame took its place; cylinders and rods were brought outside where emergency repairs could be more easily made by the engine crew. Local requirements brought additions which filled needs peculiar to our way of railroading; the cab protected enginemen in extremes of temperature rare in the British Isles; a pilot was added to prevent derailments by live-stock; a headlight of no mean size gave at least limited vision down the unfenced track at night, while both bell and whistle were large enough to warn one at considerable distances.

None of these features were commonly seen on the motive power of England. For a long time the British engineman had no shield from the elements and, until comparatively recent years, not even a cab seat. First came the "spectacle plate," a small shield with a couple of portholes, placed a few inches forward of the boiler head. Before the '90s a cab of sorts had made its appearance in varying shapes, but few of them were much protection against rain, side winds and snow. One wonders why the most important men in the handling of the train were left practically unprotected while travelling through snowstorms or downpours of rain at sixty miles per hour.

As English railroads were well fenced and the road crossings protected by gates there was little need for the pilot, its place being taken by "guard-irons" projecting down from the engine- or truck-frame to within a few inches of the rail. For like reasons headlight and bell were non-existent, and whistles of the size used in America just weren't. We have been accused of suffering from a whistling mania, but this has been mainly because of ignorance of the number of grade crossings we have been cursed with, and the length of many of our trains.

While the earlier British locomotive was plain, clean-lined and designed to please the eye, many of its American counterparts, at least during the '50s and '60s, in an era of elaborate ornamentation, were in bad taste. Landscapes, portraits, ships, animals and whatnot adorned it from headlight to tender trucks, often with little regard to esthetics. However, it may be said to their credit that several American builders fought shy of this tendency to gaudy decoration.

Came the day when Mogul, 10-wheeler and Consolidation took over most of our freight hauling and, except for heavy trains, left the 8-wheeler, or American type, supreme in the passenger field. It reached the zenith of its size and power about 1900 after which it gradually gave way to the Atlantic and Pacific types with their superior steam-producing ability. But of the several different types produced in America the 8-wheel engine of the '90s was, to many of us, the most graceful machine of its kind ever built. This doesn't mean that there were not many handsome engines of other types, nor that all 4-4-0s were beautiful examples of the locomotive designer's art. Some were anything but eye-pleasers.

About the time that American builders were beginning to incorporate good looks into their product, British builders were turning out some really beautiful machines. For one thing, by far the greater number of their locomotives was built by the railroad companies in their own shops, and almost from the outset every effort was made to insure that they were not only handsome in appearance, but that they might be distinctively characteristic of their parent roads.

The "Eight-Wheeler" has come a long way since it was patented in 1836 by Henry R. Campbell. The first one had a four-wheel leading truck, a deep firebox between the driving axles, and was built to run on strap rails laid on wooden stringers—a light, and anything but firm, track.

A few years later equalizers were added, making it a better riding machine and much easier on the track. By 1840 its three-point suspension (truck center-pin and two equalizer fulcrums) made it what was to be the best riding, steadiest and, by long odds, the most popular locomotive on American rails. Until 1900, when trains were becoming heavier, the 4-4-0 wheel arrangement had accounted for nearly 25,000 units as against less than 10,000 for its nearest competitor, the Consolidation. Because of this popularity and its almost universal use in passenger, and earlier in freight, service, it came to be known as the "American" type. It was often referred to as a "Standard" engine by old-timers, though there was little about it that was standard but the wheel arrangement.

Now to the '90s. Buchanan's New York Central engine has been chosen for comparison with a British engine of the same period, not because it was the ultimate development of its type, but that it represented the type at its peak, both in good looks and its almost universal application to American passenger service.

Buchanan's engines, though they differed basically not at all from other 8-wheelers, were simple in outline, beautiful in their proportions and splendidly adapted to hauling the Central's fast trains on its water

level tracks. About their only peculiarity was his water-table firebox, which increased heating surface and made for more perfect combustion. In his earlier 35-ton diamond stackers the oval opening in the table was 17″x22″, and in the 870 and others of her day, 19″x26″. The feature was not adopted by other motive-power men of the day, and must have been a headache to boilermakers working in the confined space in the firebox.

The 870 might be termed an American classic, just as the Great Western Railway's 3003 was as British as "tea and muffins." The Central's easy grades more nearly approached the profiles of British trunk lines than those of any other American road, and the 870 and her sisters hauled the "Empire State Express," the "Exposition Flier" and others of the road's fastest trains. The famous 999, built at the Company's West Albany shops in 1893, was simply one of the 870 class with 87½″ drivers, though actually weighing 2,000 lbs. less. This engine was pounced upon by George H. Daniels, the road's General Passenger Agent, as being great publicity stuff, and he saw to it that the world was made aware of the famous engine, her 112½ miles per hour (?) speed record, and her parent road. She was exhibited at the Chicago World's Fair (1893).

During the period when our types were mainly 8- and 10-wheel, Mogul and Consolidation, the British had a greater variety. Their workhorse for freight was the 0-6-0 or "Six-Coupled Goods" with its inside cylinders and five-foot drivers. But the great bulk of the traffic was passenger, and the Single Driver was, from the first, the popular engine for this work. It was still in the ring at the turn of the century, two different wheel arrangements, 2-2-2 and 4-2-2, being used.

For heavier work both 2-4-0 and 4-4-0 were preferred, while Stroudley's 0-4-2 with its 78″ coupled drivers was in successful use on the London, Brighton & South Coast. Beside these a number of side-tank engines with different wheel arrangements took care of the heavy suburban traffic incident to the large centers of population.

Built down to 1900, the heyday of the "Single" coincided with that of our own 8-wheeler. The type allowed plenty of latitude in producing something distinctive. Some of them became famous, Patrick Stirling's Great Northern domeless Eight-footers being probably the most widely known; Johnson's Midland engines and Worsdell's North Eastern, both 4-2-2s, were also very popular. The Single was also much in favor on the Continent of Europe; but with us, except for our earliest efforts and a couple of 4-2-2s built in later years by the Baldwin Works, it has been a rare bird.

About the only Singles left are a few museum pieces lovingly cared for in a land that cherishes memories of worth-while things of the past. No. 123 of the Caledonian Ry., one of these built in 1886, was still in service as No. 14010 on the London, Midland & Scottish, in 1930.

All Great Western passenger engines bore names, in groups mostly, of Kings, Queens, Princes, Princesses, Cities, Counties, Knights, Lords, Ladies, Saints, Castles, Flowers, etc.

Many of the engines of the 3000-3080 class were rebuilds of the old Gooch 7-foot gauge Singles, which had 18″x24″ cylinders and eight-foot

drivers, two carrying axles with 54″ wheels ahead of the drivers, and one behind the firebox, making them 2-2-2-2 in wheel arrangement.

The 3003 was one of these rebuilds. Some thirty were turned out as 2-2-2s, but results in service showed them to be rather under-boilered, also that the weight on the drivers was somewhat excessive. The leading pair of wheels was replaced with a four-wheel truck, lessening the adhesive weight, the heating surface was increased and the cylinders bushed down to 19″. The rest of the eighty engines were built to the altered dimensions, and the class proved highly successful in coping with the Company's fast passenger service. Coal consumption was from 28 to 30 lbs. per mile.

Even had these engines been ill-proportioned, their exterior finish would have made them striking. The only black used in their color scheme was on the front-end and stack. Boiler jacket, cab and tender were painted an emerald green, and striped in black and yellow. Engine and tender frames, driving wheel splashers, springs and all wheels were in a rich chocolate brown, and buffer beams in red. Driving box covers and name- and number-plates were of brass, the elaborate GWR monogram graced the middle panel of the tender, and a coat-of-arms the driving wheel splasher. A shining copper cap crowned the stack, while a polished brass dome-casing and a safety valve cover to match, completed an ensemble that caused people to turn their heads.

In Victorian days, when the Royal Navy ruled the seas and the sun never set on Britain's Empire, she financed an enormous foreign trade; her mechanical and industrial development were far out in front and her railroads were the models on which the rest of the world built. American railroading and locomotive building were something to be indulgently smiled at, or ridiculed as beneath notice.

As the United States grew and its manufacturing expanded, the average American, feeling his oats, took an understandably gleeful delight in twisting the lion's tail; and this held, among other subjects, to locomotive building. There was much pooh-poohing of the other's product from each side, some of it based on good grounds. Also there was much that was unreasoning prejudice. A scanning of the files of such periodicals as *Railroad Gazette, Railway Age, Locomotive Engineering* and like magazines in this country, and *Engineering, The Engineer* and other journals covering the British motive-power field of the period might prove both interesting and amusing to the reader.

Boiled down, the criticisms and arguments force one to the conclusion that each had much to learn from the other: that, despite its superior workmanship prior to the '90s, the British locomotive was not as well adapted to conditions on North or South American railroads as ours; admitting though that many British engines were furnished where roads were financed from London, i.e. Mexico, Central and South America. Nor were American built engines an unqualified success on British railways, where a limited number of Baldwins, Schenectadys and Cookes were ordered because of the difficulty of getting needed power quickly at home.

The fact is that there was a vast difference in the conditions under which American and British railroading were carried on. These were, primarily, the perfection of British permanent way, easier grades and curvature, the prevalent use of tunnels, and bridges and viaducts built to last centuries.

In America track was laid under what, to the European, would be insurmountable obstacles; grades up to 4% or more, sharp curves and often spindly trestle work. Rough track called for a machine that would ride it without "going in the ditch." Fast time and smooth riding were not for the Yankee—yet.

Secondly, the bulk of British traffic was passenger. Speed was an eagerly sought asset, while the locomotive presented possibilities as a publicity medium, and successfully. The scheduled speeds on British roads in the sixties were tops for the world.

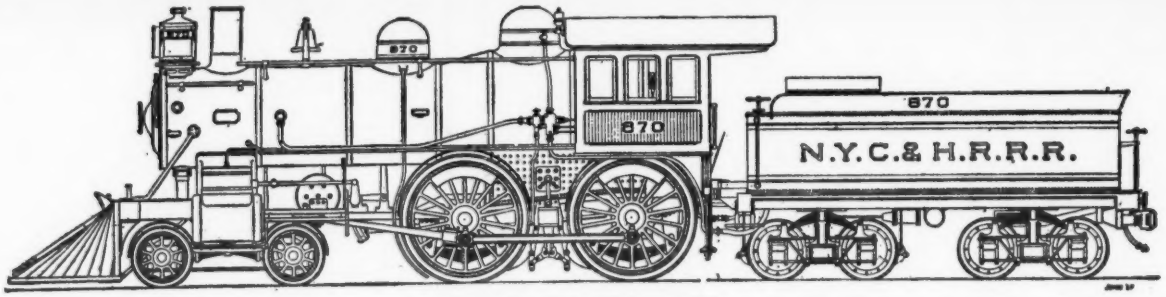
Thirdly, the loading gauge, which was not such an important factor years ago as more recently. Today it is the Britisher who is feeling the pinch of restricted clearances. With us the Diesel has been the answer as it can operate in multiple units. In England a fair average might be set at 9′ 6″ by 13′ 6″ (for single track), while ours, for which there was no set standard at the time, was roughly 10′ 6″ wide and 15′ high; at least these dimensions held for the Pennsylvania and New York Central. This gives an area of 30% in favor of the latter. The Great Western had some advantage over other British lines in this respect, as the old broad (7-foot) gauge called for slightly greater clearances.

Except for freaks there was little difference in the earlier locomotives. Soon though, American design began to take off on its own. From the first, British practice was to make the track substantial, and by 1890, ninety- and one-hundred-pound rails were no exception. The plate frame was universal, equalizers between coupled drivers were rare and, while the four-wheel truck was used, a large number of British engines had rigid or semi-rigid carrying axles. The latter was a device permitting spring controlled radial motion of the leading or trailing axle, the journal boxes sliding in a curved guide in the frame.

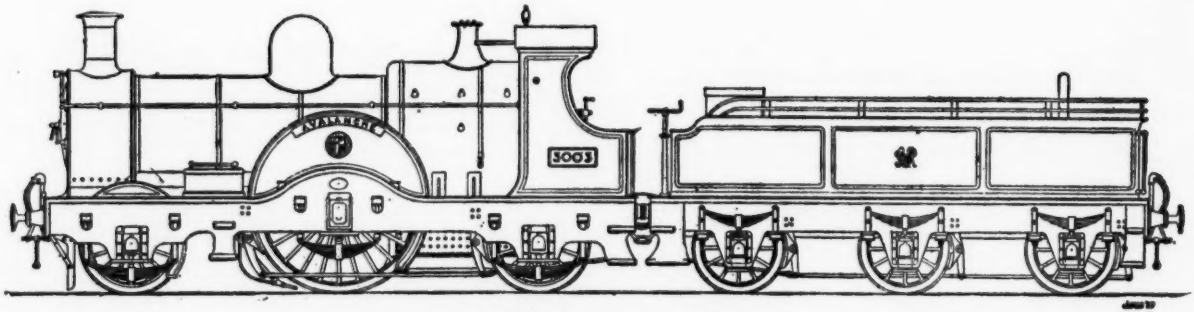
The engine might be single or double, the latter with the drivers between the inner and outer frames and journal boxes in both, an expensive construction. Bury, of Liverpool, was about the only builder of bar-framed engines, and his output was small.

Both outside- and inside-cylinders were in use, the latter preferred as they were supposed to make for steadier running; and they were not subject to loss of heat through radiation as they were surrounded by the hot smoke-box gases. Steam chests might be placed between, outside or over the cylinders, and on occasion, beneath them.

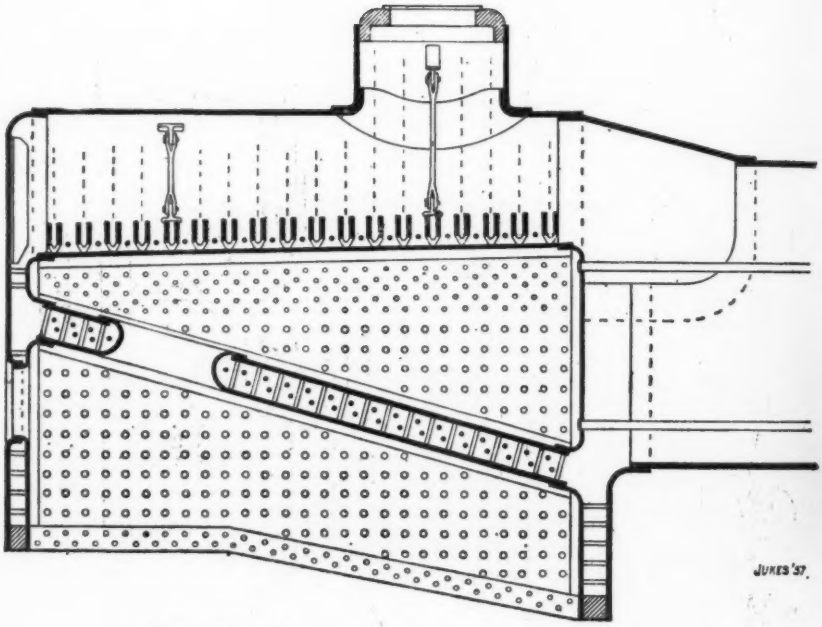
Boiler work was of a high order, and copper fireboxes and brass flues were practically universal. Driving wheeels were usually of cast steel or wrought iron, screw reverse gear was common, steam sanders were used and fire-doors opened inward. Neither engineer nor fireman was considered worthy of such luxuries as cab or seat-box, only a rudimentary shelter being provided. So they grinned and bore it!



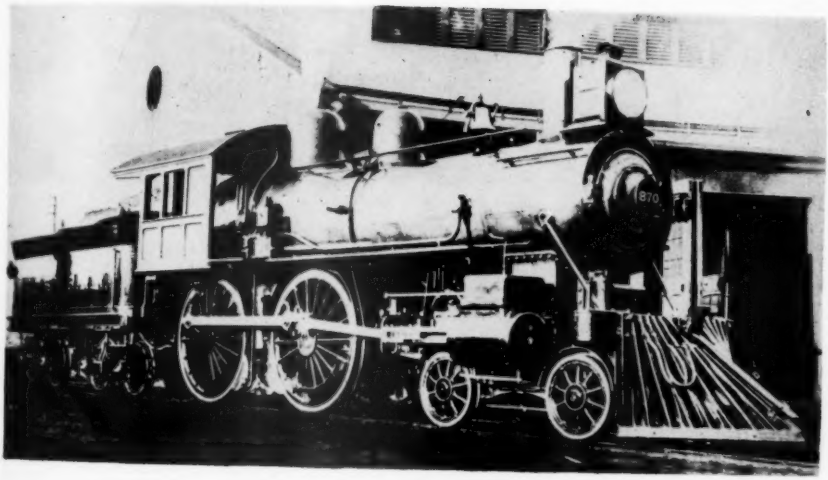
NEW YORK CENTRAL 870.
SCHENECTADY. 1890.



GREAT WESTERN SINGLE 1892

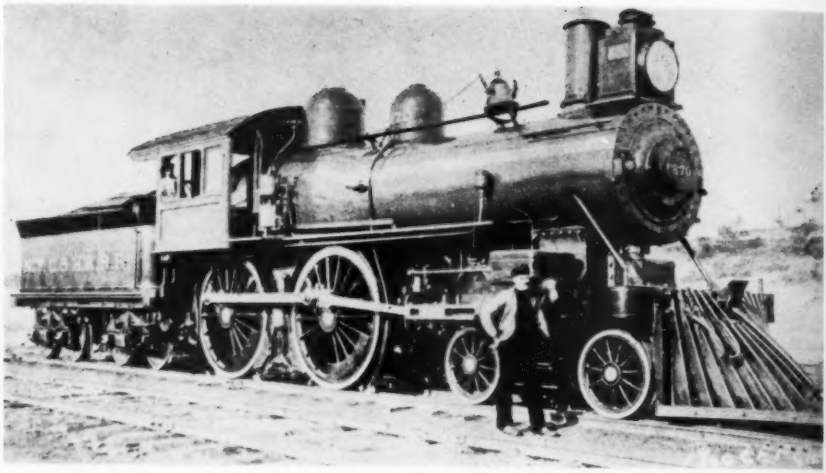


BUCHANAN'S
WATER-TABLE FIRE-BOX



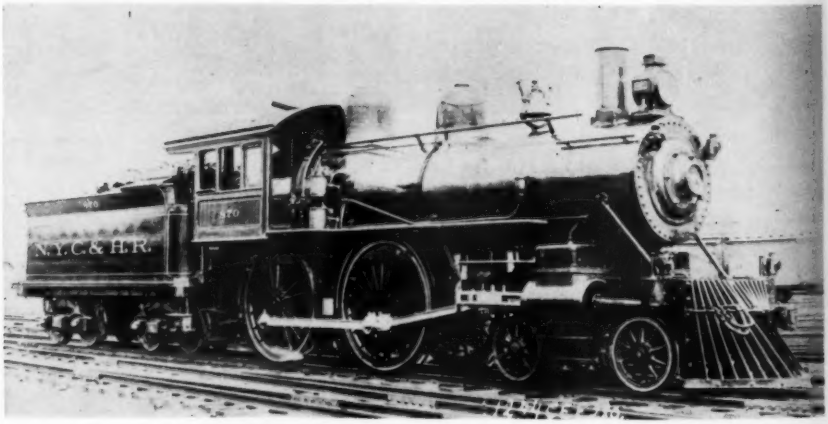
Courtesy of Brown Bros.

N. Y. C. #870 at Mott Haven, N. Y. as originally built.



Courtesy of C. E. Fisher

The #870 with 78" drivers.



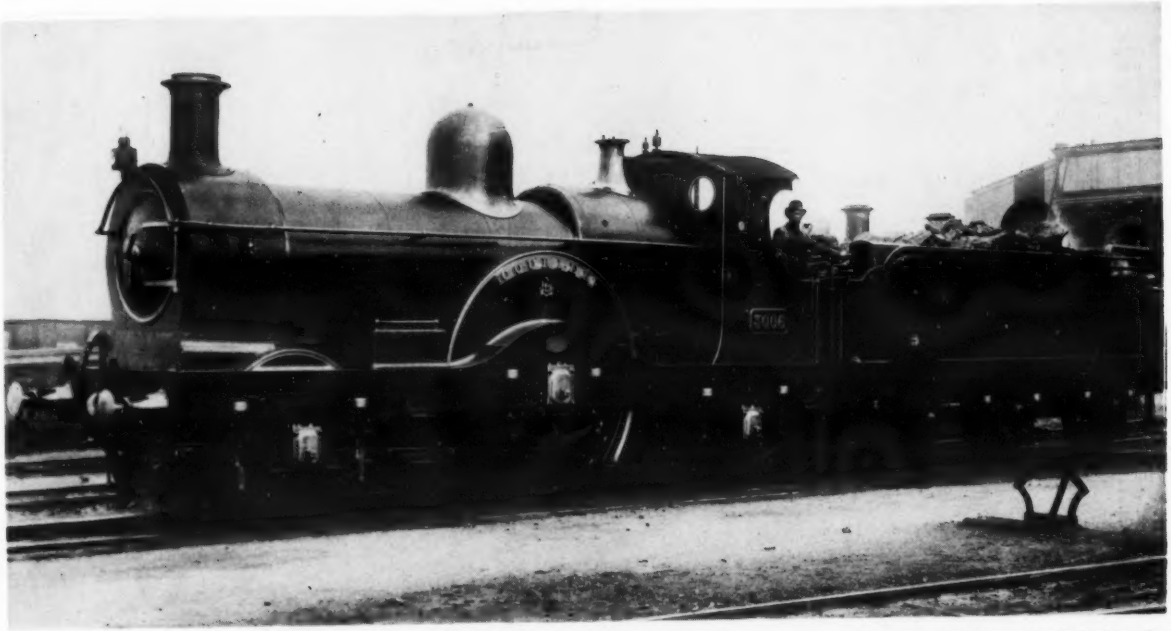
Courtesy of C. E.Fisher

The #870 of 1898.

William Buchanan, S. M. P., N. Y. C. & H. R. R. R., designer of the 870, 999 and others.

Archie Buchanan was still running a locomotive when this photograph was taken.

Archie Buchanan, Jr., who made the drawings and was responsible for the beauty of the 999, 870 and others of this class.



Great Western Ry #3006, "Courier."

Courtesy of Locomotive Publishing Co.

Tenders were of the six-wheel rigid wheel-base type, the bogie, or four-wheel truck, tender being an exception.

Good engine-steps and hand-holds seem to have always been part of British design, in contrast to the cast-iron pads and cab handles used here, a notable exception being those fitted to the Pennsylvania's engines.

Automatic Vacuum provided for braking, with very few exceptions. The track scoop, invented by Ramsbottom in 1858, was used on a number of roads operating fast through trains; and nearly all British roads placed the engineer on the left side.

Coal consumption was usually spoken of in terms of pounds per train mile, which actually meant little. Tonnage was lighter than ours and only the finest of steam coal was used on crack trains. Exhaust nozzles were large, front ends not cluttered up with nettings, baffles and other obstructions, and careful firing was the rule. All these added up to a fuel consumption unbelievably low by our standards.

British locomotives were plain and unmarred by pipes or outside fixtures. Feed was mostly by Gresham & Craven boiler-head injectors with delivery pipes inside the boiler. Each road had its own color combination, striping and lettering; polished brass dome- and safety valve-casings were common. Tenders were painted to match the engine.

The Great Western boasted shops at Swindon, built in 1842, which, by 1895, employed over 10,500 men, more than half of whom were devoted to locomotive work. The road had a mileage of 3795, and nearly 4,000 engines. This at a time when our Union Pacific had only one quarter as many.

In America few of our larger roads went in for an extensive program of locomotive building. So many firms were established to fill this particular demand, with others taking it on as a side line, that competition forced prices to a point where railroads simply couldn't afford to build their own. There were exceptions, such as the Pennsylvania, Canadian Pacific, Southern Pacific and others, but their capacity never met their needs. So, on most American roads we see examples of the product of a number of builders. Many of their engines were made to the designs of motive power chiefs, others by the locomotive works to meet certain specifications or conditions, while still others came from builders' stocks ready for immediate delivery, the 4-4-0 leading the field.

In the older countries conservatism was more in the saddle; for instance the Great Western's class of standard gauge Singles, the first of which was built in 1892 (3001-3080) were still in production in 1899, though converted to 4-2-2's, and they ran for decades afterwards. Stirling's Great Northern 4-2-2 Singles were built from 1870 to 1894, to almost their original design.

Several American roads developed distinctive designs in certain types, and among these were the New York Central's 8-wheelers of the early '90s. Designed by William Buchanan, himself a conservative Scot, they were very handsome in appearance. They varied in driving wheel diameter from 68″ to 87″, and ran on track as fast as that of the Great Western between London and Exeter.

In America passenger rolling stock was universally double-trucked, mostly with four-wheel trucks, though heavier cars were 12-wheeled. In Europe the six-wheeled passenger "carriage" was the usual thing, though there was a goodly sprinkling of "bogie" carriages. (The Great Western had used some as far back as 1851).

The difference in weight enabled the Singles to handle a train of these light coaches as easily as our friend, the 8-wheeler, picked up a train of the same passenger carrying capacity in our heavier cars. When overloaded, Singles were often double-headed, but alone could handle seven to eight eight-wheel coaches and make time.

Till comparatively recent years plate frames were as much a part of the British locomotive as bar frames were of ours, and were probably cheaper; but British builders delivered many bar-framed engines to foreign roads ordering them. Other differences, too, can be seen. The use of the vacuum brake is one that we may put down to conservatism, for Westinghouse Air outperforms it on every count. The buffer, and screw-coupling system, another relic of the past, is still in use.

To 1900 we used Russia iron for jacketing boilers. It looked good and was easy to keep clean, but it didn't stand up too well. The British used planished iron, painted to conform to the road's color scheme. By the '90s we had pretty well done away with the diamond stack and taken on the long front end. Neither was used in Britain at that time. Fire losses were light, due to the use of large exhaust nozzles, also to the small amount of frame construction. A striking feature on British engines, even from an early date, was the one-piece brass dome casting, a beautiful example of the coppersmith's art. The screw reverse gear, slow though capable of close adjustment, was in common use. With us it was not adopted generally till the advent of big power.

Summing up the differences in practise here and in Britain we come to see that it's not a matter of which is the better. Actually the motive power in each country during the era under discussion fitted its own requirements and was well adapted to its own needs.

As time went on we forged ahead of the world with huge and efficient power units. Today the latest English passenger engines are much like our Pacific and Baltic types. They, too, have reached a cross-section that has just about spelled the disappearance of stack and dome, and can go no further in boiler capacity without a radical change in design.

It is hardly necessary to describe locomotive progress in this country. Enough to say that our locomotive became too large, and too costly to keep going. It has been overthrown by what has been waggishly termed a "Glorified Evinrude". The future? Multiple unit, atomic power, gas turbine, or what? About all we can be sure of is that, as long as we use the steel rail, we must have tractive weight. Time was when we exported locomotives to every quarter of the Globe. Something beside the Diesel happened to that market, because there

is still plenty of steam being used abroad. Perhaps the economist and trade analyst can explain.

The large export of American locomotives during the '80s and '90s was in part due to methods of reducing manufacturing costs. Though howls went up from others that our product was inferior, the fine workmanship was put where needed; and obsolete tools and shops discarded. Competitors claimed they couldn't afford to buy new tools. In the meantime our man-days per locomotive were being steadily reduced. On the whole, our engines were more powerful, easier on the track and cost less for repairs. Finally the foreign builder saw the light and appears to have recaptured the market.

For us in America steam has gone. Though few expected it, the change came quickly and left the old-timer looking back at what was. In the Britain of the '90s it was 75c to $1.25 a day for the fireman, while the engineer enjoyed a princely $1.25 to $2.00. That era is long gone. Few will remember the little engines that sped the Great Western's fancy trains from Paddington and the cold rain and fogs of London, south-west through the charming English countryside for some 250 miles to the beauty spots of Southern Devonshire and the sunny Cornish Riviera with its palms and flowers, and did it in little more than that many minutes.

Even the Great Western, once England's greatest road, has lost its identity and become merely a section of "British Railways," an arm of the Government.

Many of us here in America have seen much of the growth of the steam locomotive, have watched its improvement and followed it in its final stage. It has done a grand job. Now the occasional far-off sound of its whistle brings, crowding back to one, memories; memories of the friends who ran them; of the odor of coal smoke; of a trailing plume of steam above a fast train on a cold day; the vision of a double-header dragging tonnage over the mountain; of the little Cookes rolling to the reverse curves on the old South Park; the gentle breathing of an air pump while waiting for a meet on a warm summer night on the desert; an occasional feather of steam from the muffled pops; of tail lights disappearing round the curve in the distance—and quiet.

A comparison of the principal dimensions and features of the N. Y. C. 870 and G. W. R. 3003 is shown in the following table.

FEATURE	N.Y.C. 870	G.W.R. 3003
Cylinders	19″x24″	20″x24″
Driving wheels diameter	78″, 18 spokes	92″, 24 spokes
Boiler pressure, psi	180 lbs.	170 lbs.
Boiler diameter	58″	50″
Engine wheel base	23′ 11″	18′ 3″
Driving wheel base	8′ 6″	—
Total Weight, Eng.	126,500 lbs.	97,200 lbs.
Weight on drivers	81,400 lbs.	41,800 lbs.
Total heating surface	1833 sq. ft.	1445 sq. ft.
Grate area	27.3 sq. ft.	20.8 sq. ft.
Flues	268 2″	245 1¾″
Stack diameter, inside	16″	16″
Engine truck wheels, diameter	36″	54″
Tender truck wheels, diameter	36″	48″ (six)
Height (rail to top of stack)	14′ 8″	12′ 9″
Firebox material	Steel	Copper
Flues material	Iron	Brass
Driving wheel centers	Cast iron	Wrought iron
Jacket	Russia iron	Planished iron
Tender trucks	Side bearing	Rigid wheelbase
Tender coal capacity	6¾ tons	4 tons (of 2240 lbs.)
Tender water capacity	3500 gals.	3000 gals. (Imperial)
Firebox	Water-table	Raised wrapper
Water scoop	Yes	Yes
Length over all (engine & tender)	57′ 1¾″	53′ 1″

THE MEN WHO BUILT THEM

Behind every work lie the creative efforts of one or more individuals, and it is always interesting to learn something of the persons responsible. Here are two.

William Buchanan was born in Scotland in 1830. At the age of twenty he became a machinist on the New York Central. After firing, he ran an engine for a couple of years to get road experience, after which he was made shop foreman. In 1881 he was appointed Supt. of Motive Power of the then New York Central & Hudson River Rail Road, and held that position for a number of years after turning out his famous eight-wheelers, among which was the 999.

William Dean was born in 1839, practically grew up with the Great Western Railway, serving it for almost 47 years. He was made Chief Mechanical Engineer in 1877, following Armstrong (C. M. E. 1864-77). He was with the road through its later broad-gauge days, and during the alteration of the last 7-foot track to standard gauge in 1892. He held the office of C. M. E. for twenty-five years, retiring because of ill health in 1902.

It was an era of great locomotive men on both sides of the Atlantic:— Ely, Quayle, Brown, Stevens, Henny, McConnell, Hazelhurst and Rhodes, to name a few here; and Webb, Stirling, Johnson, McIntosh, Aspinall, Stroundley, Adams, Worsdell, Holden and others in Britain. These men were individualists, and the engines turned out by each bore earmarks in design by which they could be spotted by anyone conversant with the motive power of the period. Peace to their ashes.

BEAUTY IN THE LCOMOTIVE

Possibly you've heard someone say "Boy! there's a pretty engine." Many of us have; but what constitutes beauty in a locomotive? How are you going to define it? Perhaps beauty can best be described as Perfection of Form in its Broadest Sense. Certainly it is something that appeals to the senses as opposed to what is ungainly or repulsive. Form has much to do with it, and this applies to engineering as surely as to painting, sculpture, poetry, music or nature.

In motive-power design the end and aim of mechanical heads has been to turn out a product capable of getting the trains over the road with as little trouble and expense as may be, any attempt to incorporate good looks being secondary.

A cursory examination of the catalogues of American locomotive builders of the '90s soon brings one to the realization that the product of certain designers stands out from the general run because of its higher average of this elusive something, beauty.

Take, for example, the Schenectady catalogue of 1897. To the writer, at least, it shows a greater proportion of what we might term "handsome" engines than that of any other builder of that period. This is only one man's opinion and, as beauty is much a matter of taste, there's always room for an exchange of views on the subject.

GLOSSARY OF RAILROAD NOMENCLATURE

American	*British*	*American*	*British*
Baggage cars	Luggage vans	Helper engine	Banking engine
Check valve	Clack	Lagging	Cleaning
Check valve body	Clack box	Lead engine	Pilot engine
Coaches	Carriages	Main rod	Connecting rod
Crown sheet	Firebox roof	Mud ring	Foundation ring
Cylinder cocks	Blow-off cocks	Pedestal	Horn
Deck	Foot-plate	Pedestal tie or binder	Horn stay
Engineer	Driver	Railroad	Railway
Equalizers	Compensating beams	Rails	Metals
Exhaust	Blast	Railroad shops	Works
Fireman	Stoker	Side rods	Parallel rods
Flues	Fire tubes	Stack	Chimney
Freight cars	Wagons	Throttle	Regulator
Grates	Firebars	Ties	Sleepers
Guides	Motion bars	Tire	Tyre
Guide yoke	Motion plate	Trainman	Guard
Heavy grade or hill	Bank	Truck	Bogie

*Editor's Note*s There were several things about the 870 that set it apart from the other engines of this group and it might be well to record them here, in connection with this article.

In the spring of 1890, Schenectady Locomotive Works delivered to the New York Central & Hudson River R. R., locomotives numbered 860-871 and, in the fall of that year, numbers 872-892. All of these locomotives, as built, had 70″ drivers and Nos. 860-869 were subsequently renumbered 913-922 to make room for other engines. With the inauguration of the "Empire State Express" in October, 1891, 78″

drivers were applied to the 870, in order that she might better cope with the schedule and the next engine to receive them was the No. 871, probably in order to cover the eastbound "Empire" when added.

Every morning at 9:00 A. M., Sundays excepted, Archie Buchanan, brother of William Buchanan, S. M. P., left Grand Central Station with the 870 on the "Empire." Arriving at Albany at 11:45 A. M., he returned at 2:30 P. M. on the "Southwestern Ltd." arriving in New York at 6:00 P. M. So far as I know, neither Archie nor the 870 ran on Sunday. The eastbound "Empire" was not placed in service until June 27, 1892, eight months after the westbound service had been inaugurated and, it is my understanding the 871 handled this train between Albany and Grand Central Station.

This should be the end of the story but, unfortunately it is not. In the six years that followed forty more engines of this class were delivered: Nos. 893-902 in Nov. 1891; 903-912 in the spring of 1892; 924-933 in August 1896 and 934-943 in the winter in 1897-1898. Some had 70" drivers and others had 78" and, it was during this period that Willam Buchanan did some experimenting with drivers larger than 78" on some of these engines. The frames of these later engines were longer and the engines were about five tons heavier. For the benefit of the philatelists, it was the No. 938, of this group photographed by A. P. Yates of Syracuse, N. Y., on the "Empire", the likeness of which appeared on the 2c Pan American issue of 1901 and not the No. 999 as many have claimed.

Despite these additions to the fleet of passenger engines and, they were needed to handle the additional traffic, Archie Buchanan and his 870 still covered the job. The "Empire", usually a four car train, sometimes five, gave him little trouble but, the eastbound "Lake Shore Limited" carried from eight to ten cars. Altho' the ruling grade was in favor of this run and no stops were made, the train was commencing to tax the powers of the 870 and it was not easy to pick up much time if the train arrived late in Albany.

Early in 1898, the road commenced building two new engines, similar to the above, in their West Albany Shops—Nos. 944 and 945. There are two versions as to what happened and, I'm sorry to state, the records confirm neither one. One report is that the 870, which was shopped during 1898 was renumbered 944 and the number 870 was assigned to the engine intended to carry that number. The other version is that the 870 received the boiler intended for the 944 plus certain other new parts and the new engine received the old boiler from the 870. This accounts for subsequent classifications showing the 870 being built in West Albany in 1898 and classed as the last group with the larger driving wheels while the No. 944 was built by Schenectady in 1890 and carried the construction number from the Schenectady Works same as the original 870. To this writer it seems more probable that the engine intended to receive No. 944 was assigned No. 870 and the No. 944 was applied to the older engine. At any rate, Archie received a new engine in November, 1898, when she was delivered but, even this new engine as well as many

of the others had to give way to the Atlantic types that followed shortly, in order to handle these heavier trains.

In the illustrations used, one shows the No. 870 as built with the 70″ drivers and the three panel cab. This photograph was made by F. W. Blauvelt at Mott Haven, shortly after the engine was built. A good photograph exists, taken by A. P. Yates of Syracuse, N. Y., showing the No. 862 on the "Empire", as built, with 70″ drivers and a single panel cab. How many engines of this group had the three panel cab, I don't know but they were soon covered by a piece of sheet iron. The photograph of 1891 shows the engine with 78″ drivers and the single panel cab and this was the basis of the beautiful drawing furnished by the author. Another view shows the 870 taken shortly after 1898 and there are several differences in this engine and the view taken by Blauvelt or the other illustration. Thus, when writers refer to the 870 class of engine on this road they might be asked which 870 they had in mind. For at least a decade Archie Buchanan and his 870 made the daily trip to New York State's capital and return, without much fanfare or commotion but with far more regularity than the highly spectacular and unpredictable No. 999.

Locomotives of the Montpelier & Wells River and Barre & Chelsea Railroads

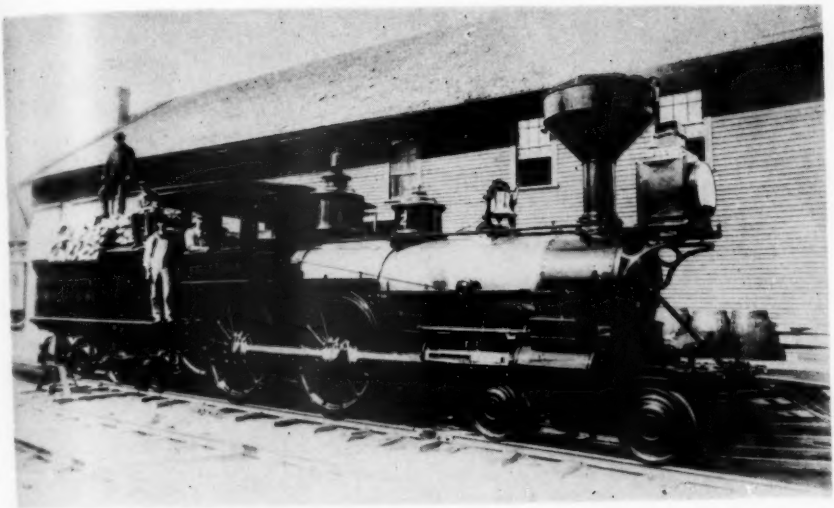
By F. Stewart Graham

The M. & W. R. was incorporated on November 11th, 1867, and was opened to traffic on September 30th, 1873. It extended from Montpelier to Wells River, in Vermont. The Barre Branch R. R., from Montpelier to Barre, was organized on August 15th, 1883, and was leased to the M. & W. R., which passed into Boston & Maine control, in March, 1911. The M. & W. R. and the B. & C., which had also been under B. & M. control, were merged as the Barre & Chelsea R. R., on January 1st, 1945, upon being released by the B. & M., and operated as an independent company.

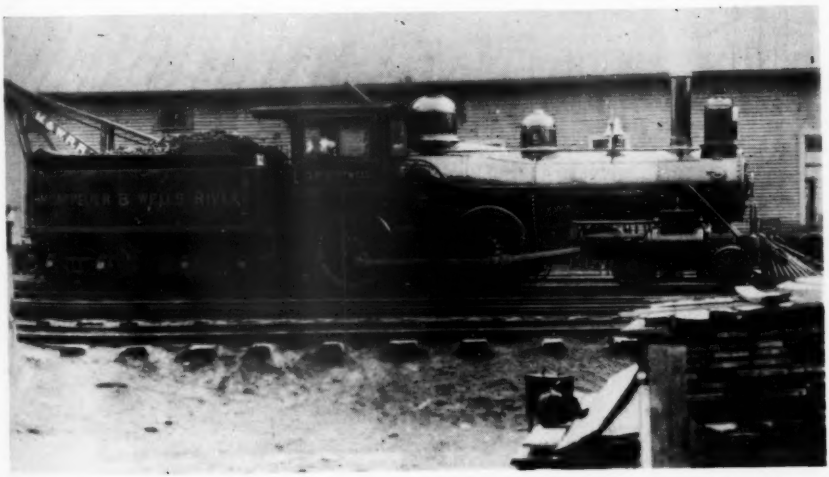
The Barre R. R., from Barre to Williamstown, Vt., was incorporated on April 9th, 1888. The East Barre & Chelsea, from Barre to East Barre, was incorporated on September 11th, 1892, and was merged with the Barre R. R., on September 18th, 1913, under the name of the Barre & Chelsea R. R., having passed into B. & M. control in 1911. It was merged with the M. & W. R., on January 1st, 1945, each road's engines retaining their original numbers, but all being lettered "Barre & Chelsea."

MONTPELIER & WELLS RIVER RAILROAD

No.	Builder	C/N	Date	Type	Cyls.	DD	Came From	Date	Went To	Date
1	Manch'r	572	1873	4-4-0	14x22	60	Builder	1873		
2	Manch'r	573	1873	4-4-0	14x22	60	Builder	1873		
3	Manch'r	574	1873	4-4-0	16x24	54	Builder	1873	BC&M 1	
3	Manch'r	630	1874	4-4-0	16x24	54	Builder	1874	Scrap	1920
4	Manch'r	575	1873	4-4-0	16x24	54	Builder	1873	C&PR 25	
4	Manch'r	1241	1885	4-4-0	16x24	63	Builder	1885	Scrap	1920
5	Manch'r	1447	1890	4-4-0	16x24	62	Builder	1890	Scrap	1920
6	Hinkley	1527	1881	0-4-4T			?		WRRR	
7	Rh. Island	3062	1895	2-6-0	17x24	57	Builder	1895	WRRR	1926
7	Manch'r	45132	1908	0-6-0	19x24	51	B&M 276	1930	B&C 7	1945
8	Manch'r	1696	1899	4-4-0	17x24	63	Builder	1899	WRRR	1928
8	Manch'r	38991	1906	0-6-0	19x24	51	B&M 230	1930	ELS Co.	1935
9	Schenect	3462	1891	0-6-0	18x24		B&M 131	10/28	RAC	12/1930
9	Manch'r	45125	1908	0-6-0	18x24	51	B&M 272	1930	SJLC	1940
9	Manch'r	45125	1908	0-6-0	18x24	51	SJLC	1943	B&C 9	1945
10	Baldwin	11054	1890	0-6-2T	16x24	45	B&C 3		RAC	1927
10	Baldwin	21541	1902	0-6-0	18x24	51	RAC	1929	ELS Co.	1930
10	Manch'r	46335	1909	0-6-0	19x24	51	B&M 284	1934	B&C 10	1945
11	Baldwin	33394	1909	2-6-0	18x26	57	Builder	1909	SJLC 11	1930
11	Manch'r	46338	1909	0-6-0	19x24	51	B&M 285	1935	SJLC 22	1942
12	Schenect	3962	1893	2-6-0	19x26	57	B&M 1323		Scrap	1920
12	Manch'r	45130	1908	0-6-0	19x24	51	SJLC 24	1942	SJLC	1943
13	Manch'r	51944	1912	4-4-0	18x24	69	Builder	1912	Scrap	1935
14	Manch'r	51945	1912	4-4-0	18x24	69	Builder	1912	Scrap	1936
15	Schenect	3966	1893	2-6-0	19x26	57	B&M 1327	1915	Scrap	1921
15	Baldwin	21332	1903	0-6-0	18x24	51	B&M 190	1926	SLS Co.	1932

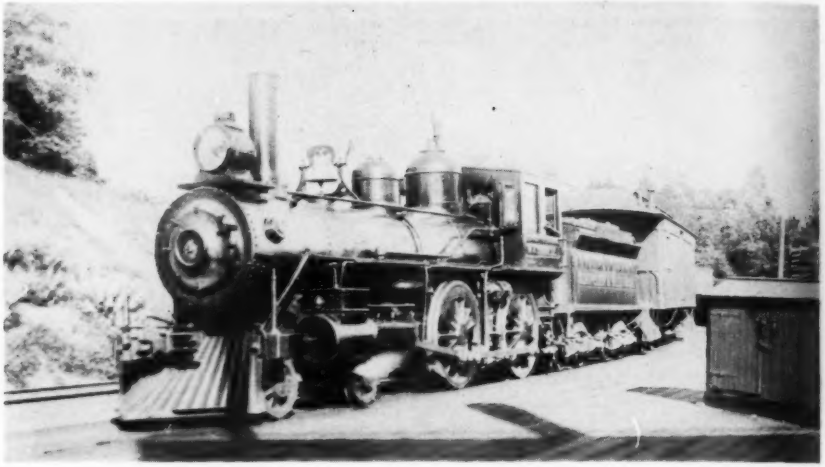


M. & W. R. "Wells River," Manchester, 1873.



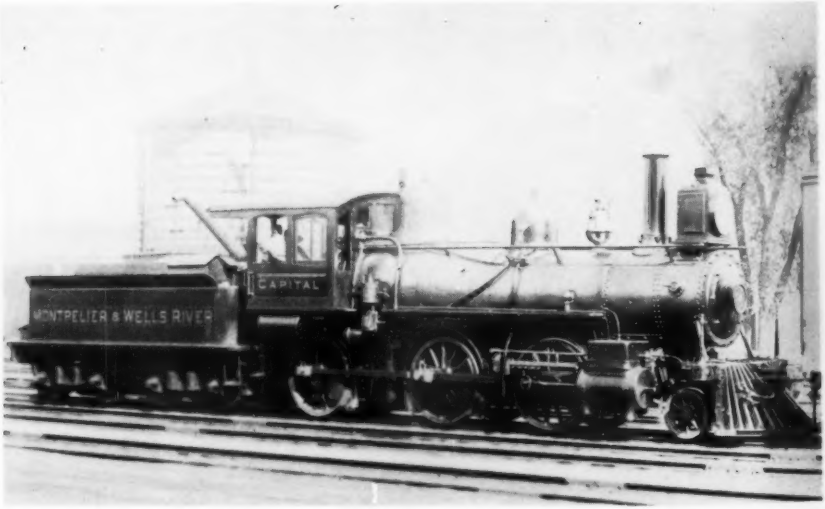
From Merrill Collection

M. & W. R. #3, "D. R. Sortwell," Manchester, 1874.



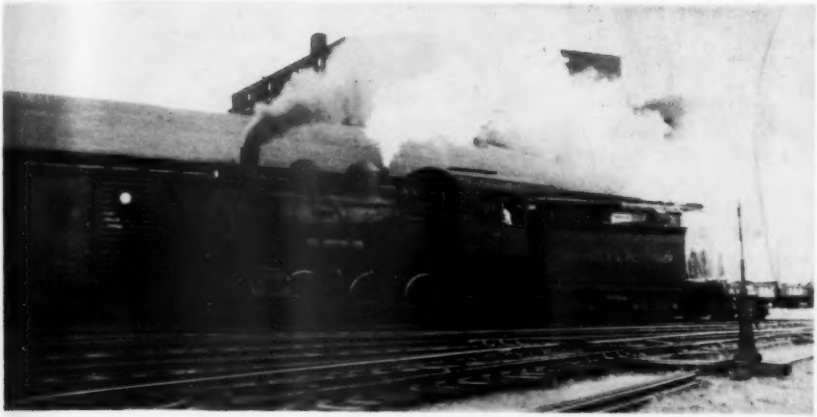
From Grigg Collection

M. & W. R. #4, "W. A. Stowell," Manchester, 1885.

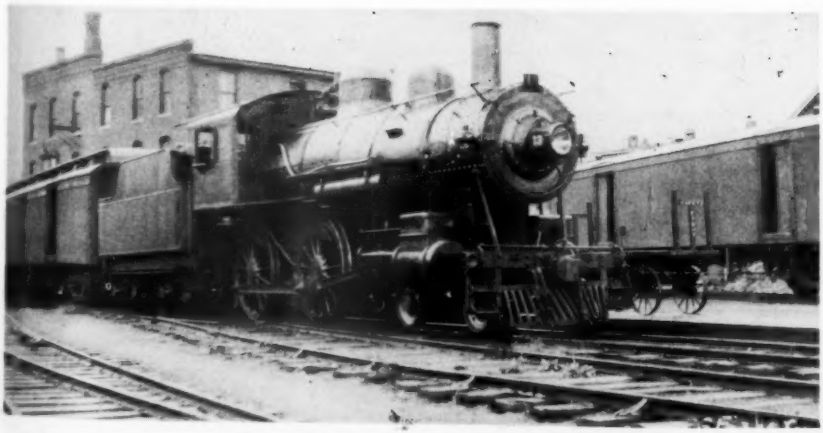


From Merrill Collection

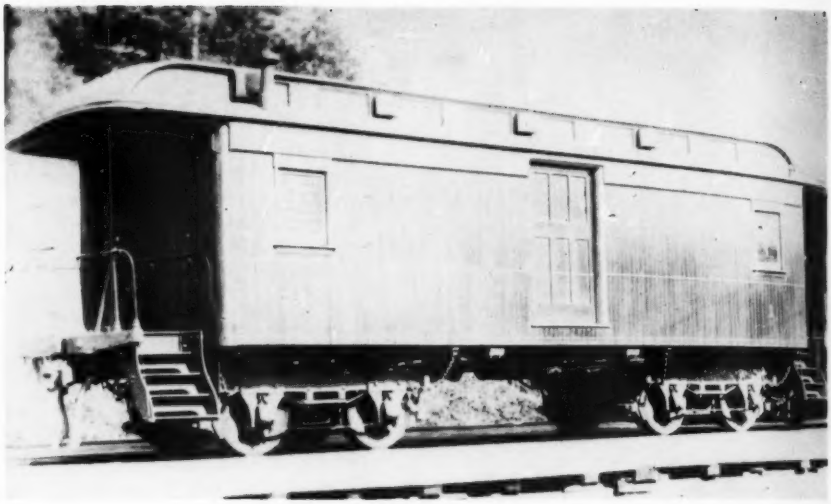
M. & W. R. #7 "Capitol," Rhode Island, 1895.



M. & W. R. #7 at Montpelier, Vt., Manchester, 1908.

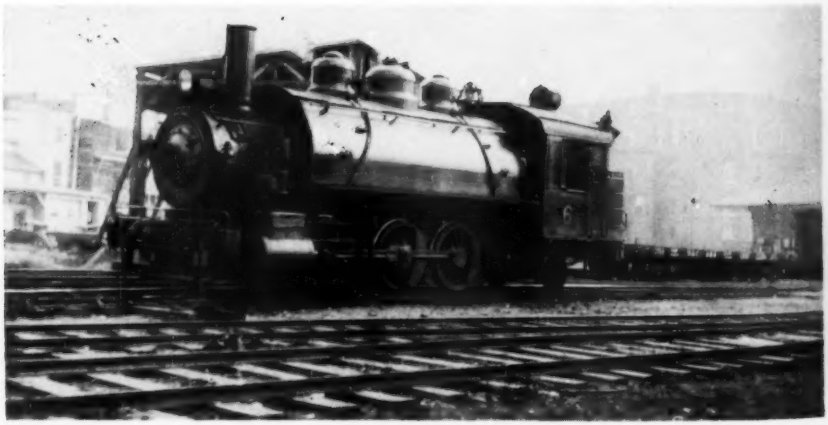


M. & W. R. #13 at Montpelier, Vt., Manchester, 1912.

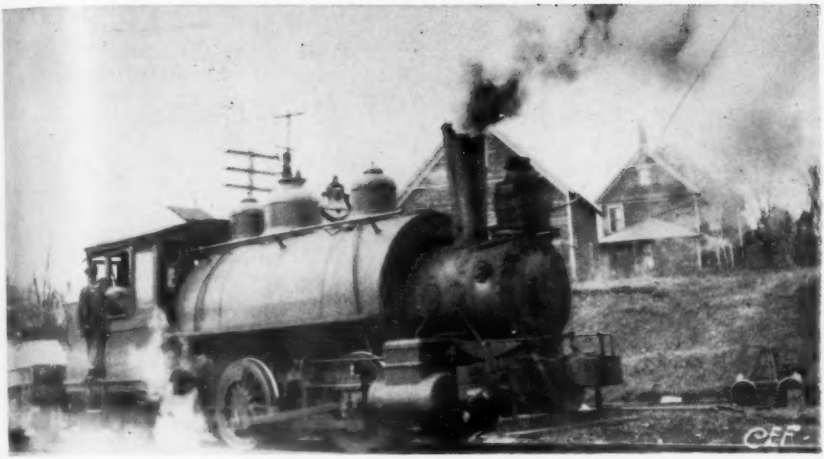


From Starbuck Collection

M. & W. R. Baggage Car #1.

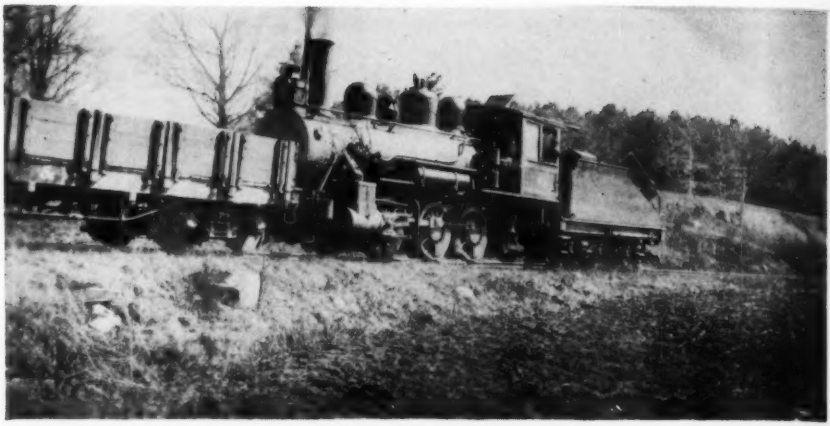


B & C #6 at Barre, Vt., Baldwin, 1912.

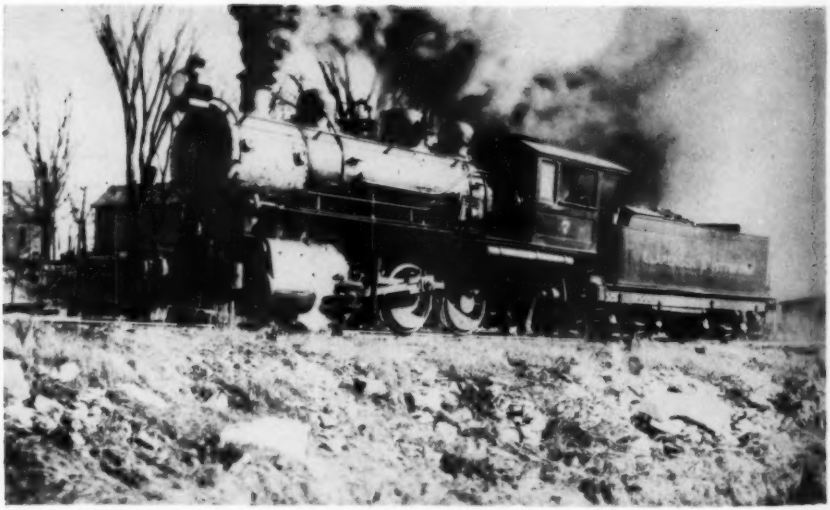


C & P #3, Baldwin, 1890.

C & P #3 on the one and only passenger train.



C & P #6, Baldwin, 1906.



C & P #7, Baldwin, 1912.

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16	Manch'r	30589	1905	2-6-0	19x26	63	B&M 1409	1926	Scrap		1934
17	Manch'r	38989	1906	2-6-0	19x26	63	B&M 1417	1926	Scrap		1933
18	Schenect	49000	1910	2-8-0	20x30	63	B&M 2420	1930	SJLC	40	1940
19	Schnect	47645	1910	2-8-0	20x30	63	B&M 2401	1930	B&C	19	1945
20	Schenect	49003	1910	2-8-0	20x30	63	B&M 2423	1932	B&C	20	1945
21	Schenect	25069	1902	2-8-0	20x30	63	B&M 2353	1935	B&C	21	1945
199	Baldwin	21673	1903	0-6-0	18x24	51	B&M 199	10/28	ELS Co.		10/28

Names

1. Montpelier.
2. Plainfield, renamed Wells River.

1st 3. Marshfield, sold to B. C. & M. #1, renamed "Granite State."

2nd 3. Vermont, renamed "D. R. Sortwell."

1st 4. Groton, sold to C. & P. R. #25, and renamed "Amos Barnes."

2nd 4. W. A. Stowell.

5. D. R. Sortwell.
6. Arthur Tandy, probably purchased second-hand.
7. Capital. Re-sold to Rock of Ages Corporation by the W. R. R. R.
8. Alvin E. Sortwell.

1st 9. #3462. Was Fitchburg Nos. 241-301-620; B. & M. Nos. 1114-131.

2nd 9. #45125. Sold to SJLC, in 1940; re-purchased in 1943.

2nd 10. Was originally B. & M. #197.

1st 12. Originally Fitchburg #245; to B. & M. Nos. 228, 1003, 1323.

2nd 12. Originally B. & M. #278.

1st 15. Originally Fitchburg #249; to B. & M. Nos. 232, 1007, 1327.

199. Was re-sold without being used on the M. & W. R.

BARRE & CHELSEA RAILROAD

No.	Builder	C/N	Date	Type	Cyls.	DD	Came From	Date	Went To	Date
1	Baldwin	9946?		2-4-2ST			BRR 1	1913		
2	Baldwin	9738	1889	0-6-0ST	16x24	45	BRR 2	1913	W-M Co.	1928
3	Baldwin	11054	1890	0-6-2ST	16x24	45	BRR 3	1913	M&WR 10	Note*
4	Lima	450	1893	Shay	11x12	32½	M&WR**	1893	H&W 1	9/96
4	Baldwin	20931	1902	0-6-2ST	17x24	49	BRR 4	1913	RAC	1940
5	Baldwin	33301	1909	0-6-2ST	19x24	51	BRR 5	1913	RAC	1948
6	Baldwin	37527	1912	0-6-2ST	19x24	51	BRR 6	1913	RAC	12/1952
7	Manch'r	45127	1908	0-6-0	19x24	51	M&WR 7	1945	RAC	1946
8	Manch'r	46339	1909	0-6-0	19x24	51	B&M 286	1946	SJLC 21	1947
9	Manch'r	45125	1908	0-6-0	19x24	51	M&WR 9	1945	Scrap	1947
10	Manch'r	46335	1909	0-6-0	19x24	51	M&WR 10	1945	Scrap	1947
11	Manch'r	45128	1908	0-6-0	19x24	51	B&M 275	1946	Scrap	1948
19	Schenect	47645	1910	2-8-0	20x30	63	M&WR 19	1945	SJLC 42	1947
20	Schenect	49003	1910	2-8-0	20x30	63	M&WR 20	1945	SJLC 44	1947
21	Schenect	25069	1902	2-8-0	20x30	63	M&WR 21	1945	Scrap	1947
22	Schenect	47656	1910	2-8-0	20x30	63	B&M 2412	1946	SJLC 43	1947

1. Said to have been purchased from the contractors who built the road. If this engine was #9946, the date built is 1889: cylinders 12"x18": DD 44".

3. *Re-sold to the Rock of Ages Corporation, in March, 1929.

1st 4. ** Ordered by the M. & W. R., and transferred to the Barre R. R. Sold to the H. & W., and renamed "E. H. Blossom." Exhibited at Chicago World's Fair.

Names

1. Granite City.
2. Mountain King.
3. Boulder.
4. (#450) Columbia.

2nd 4. Granite City.
5. Monarch.
6. Hercules, renamed. Frank H. Smith

Abbreviations

BRR	Barre R. R.
B&C	Barre & Chelsea R. R.
B&M	Boston & Maine R. R.
BC&M	Boston, Concord & Montreal R. R.
C&PR	Connecticut & Passumpsic Rivers.
ELS	E. L. Smith Co.
H&W	Hardwick & Woodbury R. R.
M&WR	Montpelier & Wells River.
RAC	Rock of Ages Corporation.
SJLC	St. Johnsbury & LaMoille County.
WM Co.	Wetmore-Morse Co.
WRRR	White River R. R.

Much of the information in the foregoing rosters was furnished by Mr. A. D. Aldrich, Montpelier, Vt., who personally checked the B. & C. motive power records.

CLARENDON & PITTSFORD RAILROAD

(Vermont Marble Company)

No.	Name	Builder	C/N	Date	Type	Cyls.	DD	Wt.	Remarks
1.	F. R. Patch	Baldwin	7761	1885	0-4-2T	14x24	46	62210	Retired 1917
2	?	Baldwin	8736	1887	0-4-2T	14x24	46	62210	
2.	E. R. Morse	Baldwin	24853	1904	2-6-0	15x22	44	59505	Retired 1918
3.	W. E. Higbee	Baldwin	11421	1890	0-4-2T	15x24	46	54000	Retired 1923
4.	Geo. C. Robinson	Baldwin	19044	1901	0-4-0	16x22	46	80000	Sold 1925 to B&M #64
5.	Geo. H. Davis	Baldwin	20459	1902	2-6-0	18x24	51	100000	Sold 1930 to Crystal River & San Juan #2
6.	B. F. Taylor	Baldwin	29826	1906	2-6-0	18x24	51	100000	Sold 1936 to CR&SJ #3
7.	C. I. Hunter	Baldwin	37541	1912	0-6-0	20x24	44	134000	Retired 1945
8.	Not named	Lima	5747	1918	0-6-0	21x28	57	173000	Retired 1945
9.	Not named	Schenect	66084	1924	0-6-0	21x28	57	168000	Sold 3-29-46, Rutland #107
10.	Diesel	Whitcomb		1945	0-4-4-0				
11.	Diesel	Whitecomb		1945	0-4-4-0				

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1. Renamed "Fletcher D. Proctor."
2. #24853 was built for the Brandon & West Rutland R. R. This road was liquidated in 1912, at which time the locomotive was sold to the C. & P.
5. This engine was later changed to an 0-6-0, and was equipped with Economy Valve Chests and superheater.
6. Was similarly converted.
8. Was purchased second-hand, in April, 1922, from the Davis Equipment Co. It was built as #1, American International Shipbuilding Corporation.

F. S. G.

The Steam Locomotives of the New Haven R. R.

By Charles E. Fisher

The New York, New Haven & Hartford R. R. was created on August 6th, 1872 by a consolidation of the New York & New Haven and the Hartford & New Haven Railroads. By means of trackage rights over the New York & Harlem R. R., the New York & New Haven had obtained an entrance to New York City with their own station on Canal Street. The consolidation placed the 125 mile road between New York and Springfield, Mass., in undisputed control of New York-bound traffic from New England, save via the steamship lines. Altho' the New York & New Haven had leased the Shore Line R. R. extending fifty miles eastward from New Haven to New London, Ct., it was not until the Connecticut and Thames Rivers had been bridged at Saybrook and New London respectively and the New York, Providence and Boston and the Old Colony Railroads acquired that this route, known as the Shore Line of today commenced to assume any importance. This was around the turn of the century and other routes were made secondary.

For the first decade of the twentieth century, the New Haven, as we shall call it, served the three southern New England states with unequalled passenger service. Timetables of that period easily confirm this statement and this good service, together with passenger fares of 2c per mile, made a good inducement for travel. These three states were not only large industrial states but there were also summer resorts to be served in the summer time.

Probably the greatest task for the Operating Department was the handling of the football specials for the Harvard-Yale Game played alternately at Cambridge or New Haven. On the day of that game in 1922, the road carried 57,000 fans to New Haven in 48 special trains which had to be fitted in with the other passenger schedules. Remember, these 48 trains also had to bring the "fans" home after the game. The string of trains, both morning and evening, was almost continuous and orders were ruthless to maintain the schedule. Any one of these specials that was failing in its schedule must take the next siding and let the others by! Every possible precaution was taken against failure or accident and this extra care more than paid off during the years.

Prior to the construction of the Hell Gate Bridge near New York City, the "Federal" and "Colonial Expresses" between Boston and Washington, together with a few summer trains to the White Mountains and Maine, were the only passenger trains to leave the rails of the New Haven. The Washington trains were ferried from Harlem River to Jersey City, P. R. R., via the transfer steamer "Maryland." The completion of Hell Gate Bridge saw considerable expansion in this service from the original two trains. With the vacationists starting around the first of July and the 4th coming on a week end, this writer

recalls a line up of engines at Cedar Hill (New Haven) about as follows: "Bar Harbor Express," eight sections, all Pullman; "Montrealer," Washington to Montreal, two sections; "State of Maine," three sections; "Night Cape Codder," two sections; "Night White Mountain Express," three sections; the "Owl" for Boston, four sections, all Pullman and the "Narragansett" for Providence and Boston, three sections. These extra sections all took additional power and crews and called for careful planning and handling.

Before turning to the locomotives of this road and we shall discuss only those built for the New Haven and not for any of the subsidiary railroads, a few facts may not come amiss. In the main, all passenger engines were originally built for Short Line service and, when they became too light for that service, were used elsewhere. In this service, engines were originally changed at New London and New Haven. Larger locomotives eliminated the change at New London but the change was still made at New Haven. When the road was electrified between New York and Stamford, Ct., in June, 1907, some of the Shore Line runs were extended from Boston to Stamford, 197 miles. A few years later, when the electrification was completed to New Haven, steam locomotives were removed or added at New Haven. Thus, the longest passenger run on the Shore Line was between Boston and New Haven, a distance of 157 miles. Practically all Shore Line engines made a round trip between these two termini every twenty-four hours.

The early locomotives of the New York & New Haven R. R. came mostly from the Rogers Works and the road assigned numbers from the very start. Those on the Hartford & New Haven R. R. came chiefly from the same builder but, both roads, during the Civil War, when it was difficult to purchase new locomotives, built or rebuilt several of them in their own shops. The Hartford & New Haven R. R. named their locomotives, but after the consolidation, the names were gradually removed. Mr. H. Kettendorf was Master of Machinery at New Haven in 1873. The engines built under his direction were handsomely finished with brass work and red paint, they had capped stacks, front ends and boiler jacketted and bound with brass bands and wheels covers or guards in place of a running board. The cab windows were neatly rounded both front and sides and a large brass plate was applied to the steam chests showing the month and year of construction. The No. 42, illustrated herewith, was typical of these engines save that the initials of the road were placed on the "dickey" of the tender instead of on the side and the coat of arms of the State of Connecticut, so far as I know, was placed only on this and perhaps a few other engines, for what reason I do not know. The small marker lamp, behind the stack, was to inform New York Central towermen between Woodlawn Jct. and Grand Central Terminal that these trains were New Haven trains and not those of the N. Y. C. The majority of the engines built by Mr. Kettendorf were of the 4-4-0 type with cylinders of 16x22", 16x24", 17x22" and 18x24", drivers either 63 or 69 inches and the heaviest weighed about forty tons. In 1880, John Henney, Jr. was appointed Master of Machinery at the Hartford Shops and he assumed full charge at the

New Haven Shops upon Mr. Kettendorf's retirement in 1884. For nearly twenty-five years, Mr. Henney was in charge of the Motive Power Department.

In going through some old papers of this road, the writer was interested to note the loan of a Philadelphia & Reading locomotive, like the No. 411 built in the Reading Shops in 1880, if not the No. 411 itself. The New Haven was having troubles with smoke ordinances in certain towns between New Haven and New York as well as the Park Ave. tunnel and it was hoped that an anthracite burner would solve their difficulties. The locomotive performed well but its design did not play any part in the locomotives of this road and it was subsequently returned to the Reading. With the exception of a group of 19x24″ 56″ moguls built in 1887, all of the Henney engines were of the 4-4-0 type with cylinders from 17x22″, 18x22″ and 18x24″, all with 69″ drivers and weighed about fifty tons. The No. 21 as illustrated herewith is a typical Henney locomotive of this period. His engines followed the pattern set by Mr. Kettendorf, they were not only handsomely finished but they were more than adequate for the service for which they were intended.

In the old series of numbers, all locomotives in the 200 series were built by the Rhode Island Locomotive Works. In 1904 the road renumbered all of their locomotives so that locomotives of the same size would be grouped and, where it is possible these renumberings will be shown in parenthesis. In 1889, Nos. 200-209 (1727-1736) were delivered from these works. They were of the 4-4-0 type, 18x24″ cylinders, 63″ drivers, weighed 96,000 lbs., 53″ boiler, 160# pressure and had a tractive effort of 17,180#. They were a dual purpose locomotive but later were used almost exclusively in passenger service. Nos. 210-219 (1640-1649) came from the same builder in 1891. These were of the 4-4-0 type, 18½x24″ cylinder, 69″ drivers, wt. 100,000 lbs., 56″ boiler, 180# pressure and a tractive effort of 18,858 lbs. They were assigned the best passenger runs on the road. Nos. 220-226 (2134-2140) were delivered in 1891. These were a Forney type locomotive with 14x20″ cylinders, 49″ drivers, wt. 81500 lbs., 41″ boiler, 160# pressure, tractive force of 11,008 lbs. They were assigned the suburban passenger runs on the Harlem River branch. Three more of these engines, Nos. 235-237 (2131-2133) were delivered in 1892. Nos. 227-234 (1415-1422) were also delivered in 1892. These were of the 4-4-0 type with 19x24″ cylinders, 68″ drivers, wt. 105,540 lbs., 57″ boiler, 180# pressure and a tractive effort of 19,890 lbs. The No. 227 illustrates this group of engines and they were used out of New Haven for both New York and Springfield. Nos. 240-255 (1559-1574 but not in sequence) were delivered in 1893 with 20x26″ cylinders, 78″ drivers, weight 125,000 lbs., 60″ boiler, 180# pressure and developed a tractive effort of 21,119 lbs. These engines burned anthracite and were used on the New York Division (New Haven-New York). Nearly all of these engines retained the New Haven influence—moulded steam and sand domes as used on those built in their own shops, absence of running boards, front end jacketted, builder's plate applied to the steam chests, square cab windows as used by Mr. Henney, flag standards on the front buffer beam, something the road continued for many years.

Mention should be made that Nos. 254-255, in the last group of engines mentioned, were originally compounds with 21&31x26″ cylinders. How long they ran as such, we do not know but, one might assume they were rebuilt to conform to the others by their builder.

As tenant of the Grand Central Terminal in New York City, the New Haven motive power officials must have been well aware of the performance of those large Buchanan-Schenectady-built American type locomotives. Whether this influenced the next order it is impossible to state at this late date but, in 1896 the Schenectady Works delivered Nos. 401-420 (1265-1284). These 4-4-0's had 20x24″ cylinders, 73″ drivers, weighed 131,000 lbs., had a 62″ boiler, carried 200# pressure and developed a tractive effort of 23,146#. They were typical Schenectady engines of which that company built so many for such roads as the C. & N. W., the Northern Pacific, the Vandalia and others. All New Haven features were discarded and they took their places on the best Shore Line trains and right up to the last of their service on this road, they always turned in a good performance. In 1900 the Schenectady Works delivered five 4-4-0's, Nos. 536-540 (1210-1214). These engines had 20x26″ cylinders, 79″ drivers, weighed 133,000 lbs., carried 200# pressure, 62″ boiler and developed 23,466 lbs. tractive effort. These engines were classed A-3, the first group were classed A-1 and the engines with the larger drivers were assigned the five hour trains between Boston and New York. Ten more of the A-3 class came from the Rhode Island Works in 1902, road Nos. 541-550 (1200-1209) and fifteen more of the A-1 class came from the same builder in 1903, road Nos. 862-876 (1250-1264). At the close of World War I, the majority of these engines of both classes were furnished with new frames, outside gears and superheated. As such, they continued to turn in a fine performance on such passenger runs out of Boston to Fall River, New Bedford, Plymouth, Cape Cod and other portions of the road as well. They could run like a deer and the writer has had many a fast ride behind them.

At the turn of the century, the road commenced replacing many of the lighter 4-4-0's with engines built in their own shops—New Haven, Hartford, South Boston, Roxbury and Norwood. New boilers and new frames furnished the foundation, parts of some of the older engines were probably used and altho' the classification lists many of them as "rebuilt," the majority of them were practically new. Their numbers were scattered in the old series and only those assigned in 1904 will be given here. Nos. 1500-1514, Class C-15, built between 1901-1904 with 18x26″ cylinders, 69″ drivers, weight 122,000 lbs., 58″ boiler, 200# steam pressure and 21,241 lbs. tractive effort, were a group of smart engines. With the bell hung directly in front of the cab, they were quite different in appearance than anything the road had ever had. Nos. 1575-1599, Class C-3b and Nos. 1610-1623, Class C-3a, both had 18x24″ cylinders, 69″ drivers, weighed 107,000 lbs., 54″ boiler carried 180# pressure and developed 17,852 lbs. tractive effort. In addition to these engines built in their own shops, the Rhode Island Works delivered in 1903, 25 locomotives, Nos. 1525-1549, Class C-3c which were similar to the C-3 classes built in their own shops. Again, at the close of World War I, many of

these locomotives were furnished with new boilers, outside gears, the C-3c and C-3b groups reclassified C-3d and C-3e respectively and they thus had many more years of service on the lighter trains of this road. Two other groups deserve mention, Nos. 1802-1808, Class D-1a, rebuilt 1897-1899 and 1815-1824, Class D-1b, rebuilt the same years. Both classes had 17x24″ cylinders, 69″ drivers, weighed 102,000 lbs., 52″ boiler, carried 180# pressure and developed 15,921 lbs. tractive effort.

Turning now to the freight engines of the Henney period, in 1888 the road ordered six locomotives of the 4-4-0 type from the Baldwin Works. These were numbered 144-149 (1400-1405) and they had 20x22″ cylinders, 68″ drivers, weighed 112,590 lbs., with 60″ boilers, 180# pressure. These engines had all of the New Haven features. No. 148 is illustrated, but the dome castings were of the Baldwin pattern. It was the intention of the road to use these six engines in freight service but, they were over-cylindered. They would start a whale of a train, for those days, out of a yard but they would die on the road. They were subsequently furnished with new 19x24″ cylinders which gave them a T. E. of 19,890 lbs., placed in passenger service and continued in that service until scrapped.

In 1893, the Rhode Island Works delivered 20 moguls larger than anything the New Haven had ever received. Numbered 256-275 (526-545) but not in the same sequence, these engines had 20x26″ cylinders, 63″ drivers, weighed 126,000 lbs., 60″ boiler, 180# pressure and developed 25,553 lbs. tractive effort. The last ten engines were delivered in 1894. These engines had smooth dome castings, running boards, front end jacketted and bell hung in front of the cab. The large cab contained three windows, the stack was of the boot leg type and, all in all, they were a handsome freight engine, as the illustration shows and they turned in a good performance. In 1894 the same works delivered 25 consolidations, 2-8-0 type. These were numbered 276-300 (200-224) with 21x26″ cylinders, 51″ drivers, weighed 156,000 lbs., 72″ boiler, 180# pressure and developed 33,590# tractive effort. These locomotives with their huge boilers for that day, had many of the features used on the moguls. The No. 278 is illustrated herewith. Both groups of engines were placed in Shore Line freight service but the moguls, tho' they could not handle the same tonnage had more agility and, on a road where the passenger trains are fairly thick, this counted in the movement of freight. More "consols" were acquired when the New Haven took over the New England and Central New England Railroads but these were the only group of "consols" ordered by the New Haven for their own use. The management preferred the mogul and for almost two decades it was their standard freight engine.

In 1896, the Schenectady Works delivered a group of moguls, Nos. 421-430 (490-499) with 20x28″ cylinders, 63″ drivers, weight 125,000 lbs., 62″ boiler, 200# pressure and developed a tractive effort of 30,233 lbs. Ten more came in 1898, Nos. 431-440 (480-489). Like the Class A-1 passenger engines, they departed from New Haven standards and were a typical Schenectady locomotive and gave satisfactory service to the last. Nos. 511-534 (396-419) came from the same builder in 1900 but

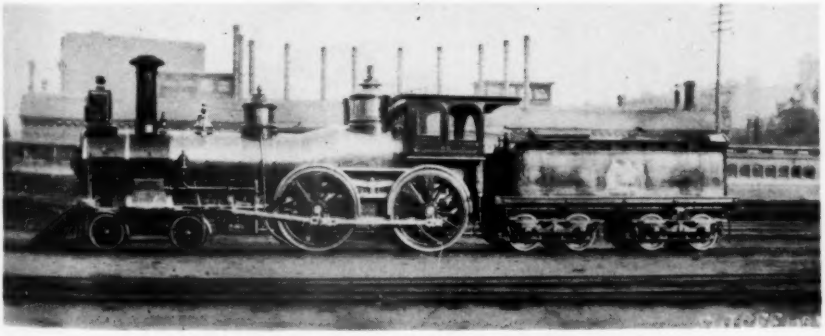
weighed 151,000 lbs. New Haven No. 535 (325) was a tandem compound from Schenectady in 1900 with 14&26x28″ cylinders, 63″ drivers, weighed 157,000 lbs., 200# pressure and a tractive effort of 26,630 lbs. The engine was subsequently rebuilt to a simple engine to conform to the others.

Similar engines came from the Rhode Island Works. Nos. 551-575 (300-324) came in 1902; Nos. 576-595 (371-390) came in 1903; 596-600 (391-395) were delivered in 1904 and 881-900 (351-370 but not in sequence) came in 1904. Some of these locomotives at the close of World War I were equipped with superheaters and outside gears. Unfortunately the road increased the diameter of the cylinders to 22 inches and when given the full (new) tonnage, they had more than they or the fireman could handle. Had the cylinder diameter remained as built, they would have been better engines. During World War I many of this class were equipped with steam heat equipment and used on the troop trains to Fort Devens as well as in local passenger service, continuing in the latter service after the close of the war.

In addition to the American type locomotives built in the railroad shops, the road built or rebuilt a number of six wheel switching engines between the years 1896 and 1904. Most of the locomotives numbered between 2523-2541 (new series) were in this group. Nos. 2542-2562 all came from the Rhode Island Works, 1892-1895 with 18x24″ cylinders, 45″ drivers, weight 94,000 lbs., 145# pressure and tractive effort of 20,798 lbs. These switchers, with their steam domes inside the cab were hot in summer and plenty warm in winter. The first of the larger switchers were a group of Schenectady compounds delivered in 1900. Numbered 441-450 (2310-2319) with 20½&31x26″ cylinders, 51″ drivers, weight 132000 lbs., 215# pressure they developed a tractive effort of 36391 lbs. Originally classed as T-1 they were subsequently rebuilt to simple engines with 19x26″ cylinders, reclassified T-2a and, it is of interest to note that as late as 1917, Nos. 2312 and 2315 were still running as compounds. In 1902 Nos. 2300-2309 came from the Rhode Island Works and Nos. 2326-2343 were delivered in 1904—their original numbers were scattered throughout the old series. All had 62″ boilers, they looked big, for those days, they were well designed and they were very much needed for making up the longer freight trains in yard service.

Charles Peter Clark, President of the road since 1887, died in Nice, France, in 1901, where he had gone hoping to recover his health. During his regime the road had been brought to a first class condition and had been expanded, by means of leases of other railroads, to nearly 2000 miles. New Haven stock paid 10% dividends and was considered gilt edge. Over 50% of the total earnings of this road came from passenger service, one of the few such roads in this country and the passenger service paid and paid well. Charles Peter Clark was an outstanding executive and, during the next fifty years, only one man occupied this office that could in any way approach his capabilities. After Mr. Clark's death, new policies were the order of the day and, in 1904, in a fit of disgust, John Henney, Jr. resigned his office. In the years he was the

New Haven #21, New Haven Shops, 1885, C-19a. 18x22" 68" 84260.

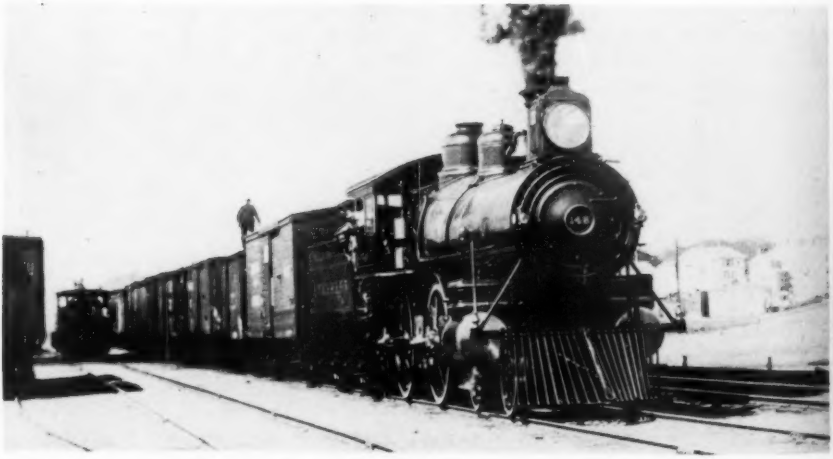


New Haven #42, New Haven Shops, 1873. 17x22" 69" 71200.

Note arms of State of Connecticut on side of tender.

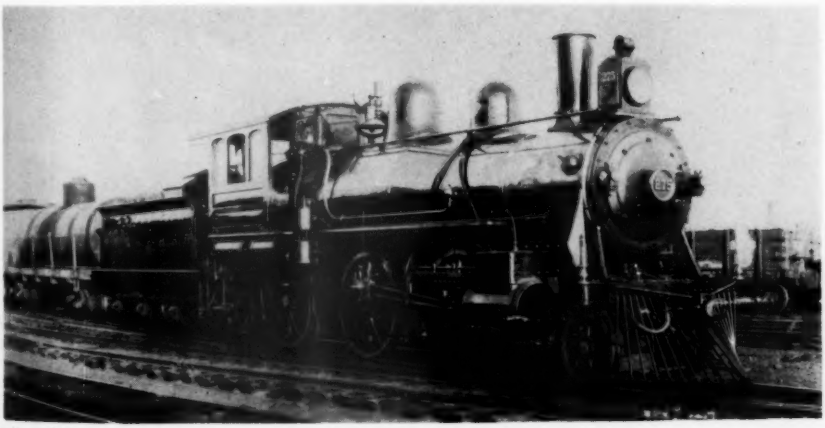
From Grigg Collection

New Haven #77, Rhode Island, 1893, U-3. 18x24" 45½" 90400.



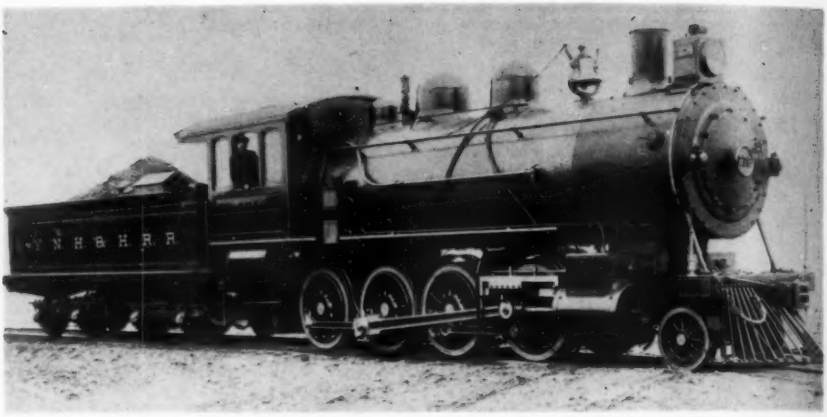
New Haven #148, Baldwin, 1888, B-4. 20x22" 68" 112590.

New Haven #227, Rhode Island, 1892, B-2. 19x24" 69" 110000.



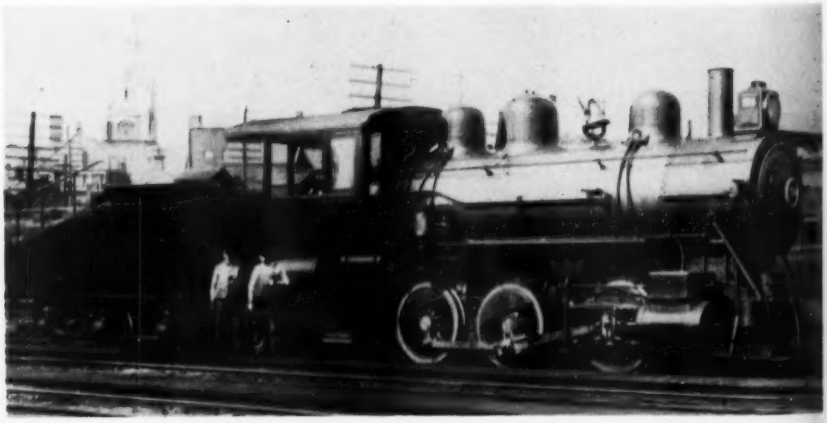
From Burr Collection

New Haven #275, Rhode Island, 1894, K-2. 20x26" 63" 124950.



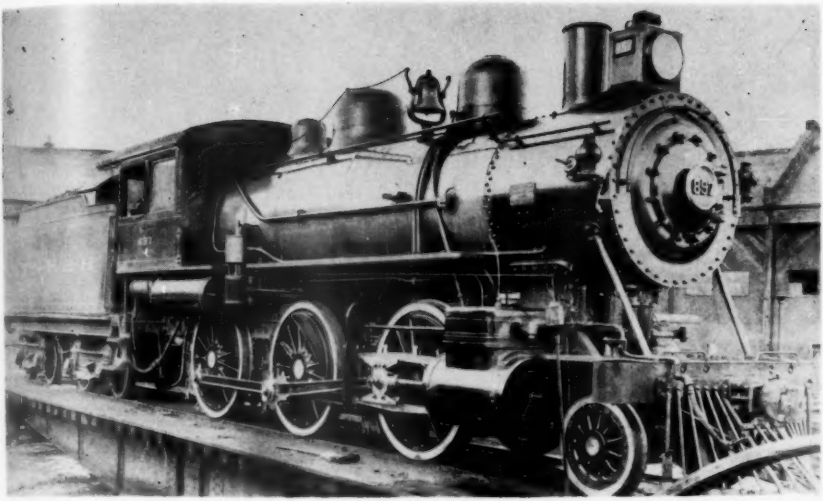
From Burr Collection

New Haven #278, Rhode Island, 1895, P-1. 21x26" 51" 155870.



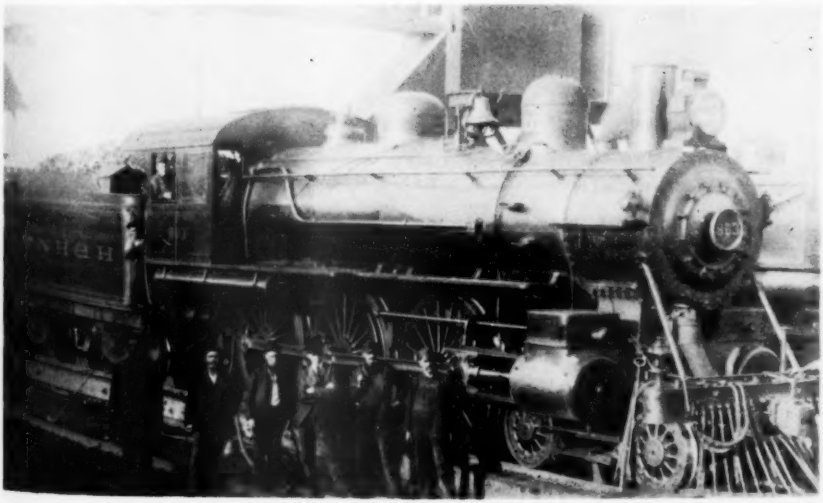
From Merrill Collection

New Haven #794, Rhode Island, 1904, T-2t. 19x26" 51" 132000.



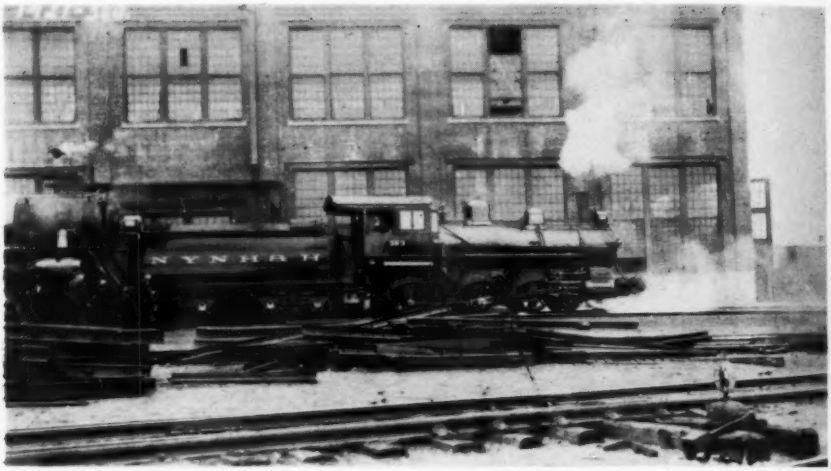
From Burr Collection

New Haven #897, Rhode Island, 1904, K-1b. 20x28" 63" 151000.

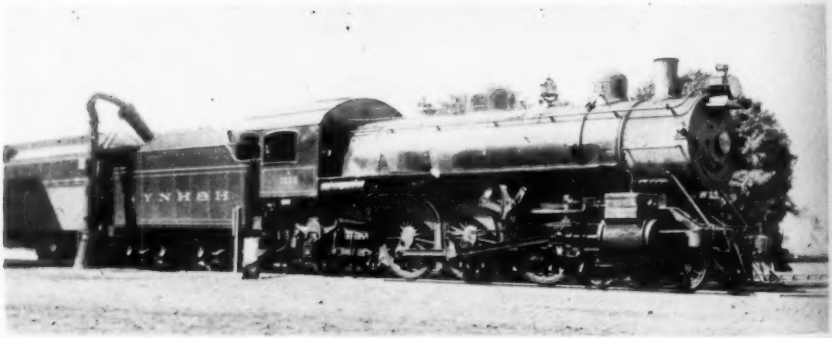


From Burr Collection

New Haven #803 at New Haven. Baldwin, 1904, G-4a. 21x26" 73" 151000.

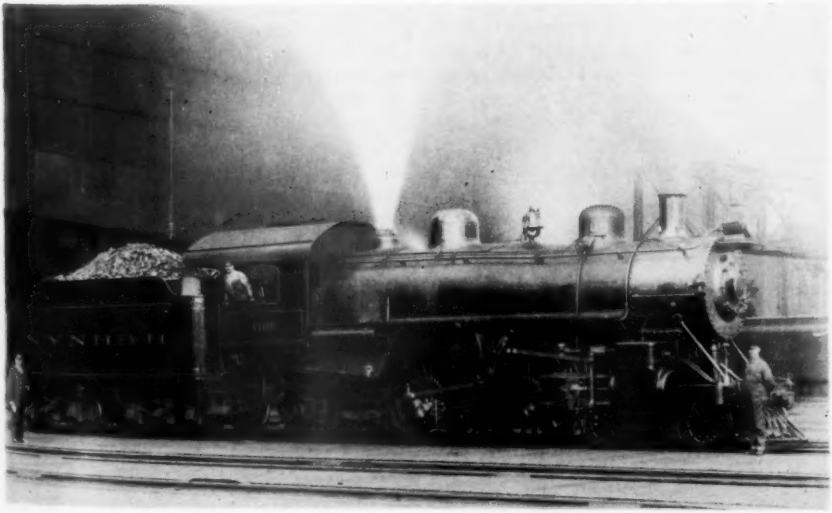


New Haven #963 at Readville, Mass. Rhode Island, 1903, G-3. 19x26" 57" 125000.



New Haven #1025 at Kingston, R. I. Baldwin, 1907, 1-I. 22x28" 73" 229500.

New Haven #1095 at South Sta., Boston, Mass. Baldwin, 1913, 1-3. 24x28" 79" 246000.

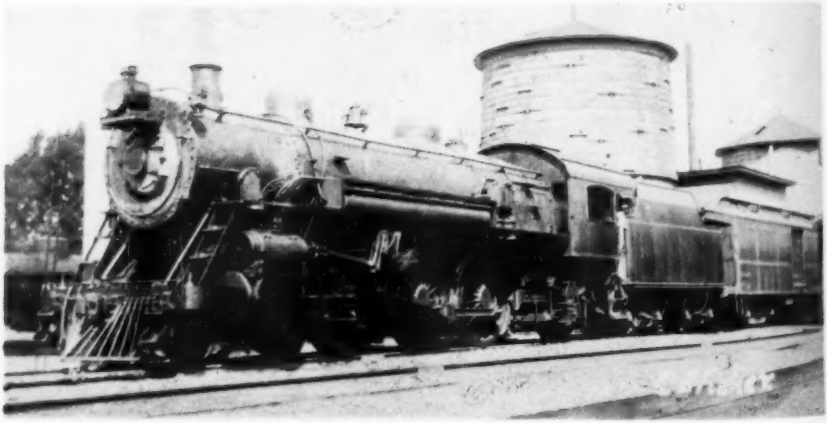


From Merrill Collection

New Haven #1100 at South Station, Boston, Mass. Schenectady, 1907, F-1. 21x26" 79" 200000.

From Burr Collection

New Haven #1274, Schenectady, 1896, A-1. 20x24" 73" 131000.



New Haven #1348 at Kingston, R. I. Brooks, 1913, I-2. 24x28" 73" 251500.

head of the Motive Power Department, he provided the road with well designed and well constructed locomotives and kept them in tip top condition. He did not hesitate to try innovations and if successful, they were adopted. F. N. Hibbetts succeeded Mr. Henney in 1905, he was succeeded by F. N. Hyndman in 1906. Mr. G. W. Wilden came in 1907 and remained until 1915. In 1917, Mr. E. J. Pearson became President and he brought Mr. W. L. Bean who was appointed Mechanical Assistant to the President. Mr. H. L. Oviatt was S. M. P. in the 1920's and he was succeeded by Mr. W. L. Bean and this brings us to the close of the steam locomotive era. John Henney, Jr. was sorely missed during many of those years.

The engines ordered the first few years after Mr. Henney's resignation followed the general pattern of those that had recently been delivered. It was in September, 1904 that the road renumbered all of their steam locomotives, grouping them according to their wheel arrangement and size of cylinders and, a remarkably complete job was done in this renumbering. In 1905, the Schenectady Works completed Nos. 326-350 and 420-434 while from the Baldwin Works came Nos. 435-479. Classed as K-1b, 2-6-0 type they were generally similar to the others. In 1907, Nos. 260-284 came from the Baldwin Works and Nos. 285-299 came from the Cooke Works—all classed K-1b. This gave the New Haven road 240 of these K-1 moguls and, for their day (wooden equipment and lighter trains), they could and did turn in a good performance. In the face of such dense passenger traffic, freight trains had to be moved and moved rapidly and it was not until later years, that heavier trains could be handled by larger locomotives. For switching engines, the Rhode Island Works delivered Nos. 2373-2399 in 1905; Nos. 2400-2434 in 1907 and, from the Cooke Works came Nos. 2435-2444 in 1910 and Nos. 2445-2469 from the same works in 1913. All were class T-2b and were similar to those delivered in 1904 save they were slightly heavier.

In the fall of 1904, the road received from the Baldwin Works road Nos. 800-819 and 858-859. These were of the 4-6-0 type, class G-4a, with 21x26″ cylinders, 73″ drivers and weighed 151,000 lbs. Nos. 858-859 were Vauclain compounds, class G-4b with 15&25x26″ cylinders, 73″ drivers and weight of 161,000 lbs. These compounds had the main rod coupled to the first pair of drivers and they continued in service until at least 1907 when they were rebuilt to simple engines, reclassified G-4a. Nos. 819-844 came from Baldwin in 1905 and Nos. 845-849 were delivered in 1907. The first group of these engines were distinguished by their tall sand domes, as shown in the illustration of No. 803, subsequent groups had theirs more rounded and lower. For three years these engines handled the Shore Line trains and then they became too light. At the close of World War I, the majority of these engines were given new frames, outside gears, cylinders enlarged to 22″ and, with 190# pressure, these engines developed a tractive effort of 27,840#. A large group of these engines ran out of Boston and were used on trains to Fall River, New Bedford, Plymouth and Cape Cod as well as on the old Midland Division. With the New Haven steel coaches weighing around 60 tons, these engines could and easily handled five and six car

trains with ease and some of the suburban trains were heavier. They were easy to fire, good steamers and they were well liked by the crews. In the opinion of this writer, it would have paid the road to have reboilered several of these engines for continuation of this service and scrapped some of the Pacifics that replaced them in later years, engines that did not do as well and cost more to operate.

In 1904, the Rhode Island Works delivered twenty locomotives, Nos. 950-969, 4-6-0 type, Class G-3. With 19x26″ cylinders, 57″ drivers, weight 125,000 lbs., 55″ boiler, 160# pressure, tractive effort 22,935 lbs., these engines were intended for freight service where it was impossible to run the heavier moguls whose weight was concentrated on four axles. The original numbers of these engines were scattered throughout the old series as they were delivered prior to the renumbering. With the bell directly in front of the cab, they resembled some of the 1893 moguls as well as some of the passenger locomotives built in the shops of the company. They served their purpose but they were not outstanding.

Up to this time the repair shops of this company had been scattered over the system as the result of the acquisition of the several railroads controlled by the New Haven. The largest and best equipped shops, at the time, were at New Haven but, hemmed in by the water and the main line, there was no chance for expansion. In 1907 the road completed the new shops at Readville, a few miles outside of Boston. Here was a modern locomotive shop with cranes large enough to handle the heaviest locomotives for years to come, freight and passenger car shops and it was here, that the major repairs to steam locomotives were made.

In 1907, road Nos. 1000-1008 came from Schenectady and Nos. 1009-1029 came from the Baldwin Works. Schenectady delivered Nos. 1030-1031 in 1910. All were of the 4-6-2 type, Class I-1, with 22x28″ cylinders, 73″ drivers and weighed 229,500 lbs. The engines had the Walschaert valve gear and were called "grasshoppers." The tenders were very short and high, due to the shortness in the length of the turntables which was corrected in the new engine terminals built at Boston, New Haven (Cedar Hill) and Stamford. The Road Foreman of Locomotives of the Boston & Albany told me one time that several of these engines were in service on that road until the turntable situation had been corrected. These engines were subsequently superheated, cylinders enlarged to 23″ and, with 200# pressure developed 34,493 lbs. tractive effort. These engines always had the old Johnson bar and, with a heavy assignment, the crews were inclined to let the bar stay in the corner rather than to attempt to hook it up. A power reverse gear could have remedied the situation in later years for these engines always were smart but the two to four car trains that they were assigned to the last of their days could have been better handled by those of the G-4a class had the road decided to reboiler them.

With the heavier Shore Line passenger trains covered by the new Pacifics, the road received a dozen engines of the Atlantic type from the Schenectady Works that same year. These engines were designed for the five hour trains between Boston and New York. With 21x26″ cylinders, 79″ drivers and a weight of 200,000 lbs., class F-1, reclassified

H-1, these engines also had the Walschaerts valve gear and had many of the features of the Class I-1 engines. All of these engines were subsequently superheated, cylinders enlarged to 22″ and, with 190# pressure developed 25,725 lbs. tractive effort. But, the five hour trains soon outgrew these locomotives and they were assigned other runs. When the "Comet" was placed in service between Boston and Providence, two of these engines were held in standby service in case of failure—an Atlantic and a two car train was provided. Terminal time did not always allow for the backing to the engine terminal, turning and return, hence the extra engine but, with two steel cars, these Atlantics could equal and frequently bettered the sixty mile an hour schedule of the "Comet." With a load they could handle, make no mistake, these engines could run but, like many others of this type, they were not suited for other service.

In 1913, the Brook Works delivered fifty locomotives of the Pacific type, Nos. 1300-1349, Class I-2. These engines had 24x28″ cylinders, 73″ drivers, weighed 251,500 lbs., carried 200# pressure and developed a tractive effort of 37,558 lbs. They came equipped with superheaters, Walschaert gear but, they had the old style Johnson bar tho' it was better balanced than on the I-1 class. They were placed in Shore Line service immediately and they turned in a fine performance. In the years to come they served to cover the extra trains during the holiday rush periods, they served as power on fast freight trains and, given a chance, they would do the job. Here again, it would have been money well spent to have equipped these engines with power reverse gears as they were not too difficult to fire.

The same year, 1913, the Baldwin Works delivered six Pacific type locomotives, Nos. 1090-1095, Class I-3, with 24x28″ cylinders, 79″ drivers weighing 246,000 lbs., 200# pressure and a tractive effort of 34,705 lbs. These six engines were intended for the five hour trains but they did not last long in that service. They were difficult engines to fire, they had the habit of leaving the rail when backing over switches which did not help matters getting an extra fare train from the coach yard to the South Station. All were soon relegated to secondary service.

In 1916, the Schenectady Works delivered fifty engines of the Pacific type, road Nos. 1350-1399, class I-4. These engines had 26x28″ cylinders, 79″ drivers, weighed 266,000 lbs., Walschaert gear and were modern in every way. These engines had power reverse gears and during their "teething troubles," the road discovered the area of the exhaust port was fully as important as the area of the intake port. They came with an unusually large headlight, placed on a bracket on the smokebox door and, it was the hope of the management that these would satisfy an expected order from the I. C. C. for electric headlights. It did not! Despite this, they were a very handsome engine—as built. They went through World War I and turned in a good performance but, at the close of hostilities, the road did considerable rebuilding on all of the locomotives of this class. In the first place, it was believed that these engines would turn in a better performance (less coal and less flogging) if they had a 25″ cylinder. The No. 1382 was the first one to be bushed

down to this size and the management's belief was justified. Granted that the smaller cylinders did not permit the starting of as heavy a train, theoretically, but the road performance was far better and the coal consumption was less. The No. 1356 was the first one of this class to have the feedwater heater applied and, as time passed, others received this device along with thermic syphons and type "E" superheaters. These engines carried 200# pressure and developed 37,650 lbs. tractive effort. They were used on the best as well as the heaviest trains—14 Pullmans sometimes and, it was not uncommon for them to cover a lighter run in their layover in Boston. Their cabs were low slung and roomy, the engines rode well and if ever a group of engines paid for themselves in the passenger service of the New Haven, these I-4 engines were the ones. No I-4 was ever kept waiting for repairs at Readville.

No more passenger engines were ordered by the road until Baldwin delivered ten of the Hudson type. Nos. 1400-1409, Class I-5 were delivered in 1937, the second group to be assigned these numbers. With 22x30″ cylinders, 80″ drivers, weight 365,300 lbs., 285# pressure, they developed a tractive effort of 44,000 lbs. The Hell Gate Bridge trains were taxing the efforts of the I-4 engines and these ten locomotives replaced them on those runs as well as some of the others. They were streamlined, finished in black and stainless steel with the road's monogram on the tender. Their deep steamboat whistle always identified them. They gave some trouble at the outset but these were soon remedied and they were well on their way to set a record equal to that of the I-4 group. Unfortunately the diesel-electric shortened their span of life and altho' they were offered for sale, there were no takers and the result was that they were scrapped with many years of service left in them.

The first group of large freight engines came from the Schenectady Works in 1916, Nos. 3000-3024, Class J-1. These were of the 2-8-2 type with 25x30″ cylinders, 63″ drivers, weighed 251,750 lbs., carried 200# pressure and developed 50,600 lbs. tractive effort. Like the I-4 engines, they originally carried a large oil headlight for the same purpose and they followed the general design of the I-4 group. In later years, Nos. 3023-3024 had the McClellan watertube firebox applied at the Readville Shops and the reports turned in by these applications led the road to apply this device on an order of Mountain type locomotives. These locomotives were used on the Shore Line and generally turned in a good performance.

The same year, 1916, five more of this type, Class J-2, Nos. 3100-3104 came to the New Haven and three for the Central New England, subsequently renumbered 3105-3107. These engines had 26x32″ cylinders, 63″ drivers, weighed 309,600 lbs., carried 200# pressure and developed 58,732# tractive effort. These engines were intended for Cedar Hill-Maybrook service but, given their proper tonnage, it was almost impossible for any fireman to keep them "hot." They were assigned other service and found wanting and finally, around 1919, they were assigned pusher service in the Bay Ridge-Hell Gate area where they ended their days. It was planned at one time to apply stokers to these engines but this was found impracticable. There was a genuine sigh of

relief when they were taken from road service and sent to Bay Ridge.

The financial troubles of the New Haven reached a climax in the fall of 1913. Altho' this resulted in a curtailment in the passenger service, the following year saw the start of hostilities in Europe. This brought an increase in freight traffic, especially on the west end of the road serving the many industrial centers. The moguls of the Henney administration were unable to cope with it even with the help of the J-1 and J-2 classes. During the war years and including those under U. S. R. A. control, the New Haven rented locomotives from the Boston & Albany; New York Central; Pennsylvania; Lackawanna; Lehigh & Hudson; Erie; N. Y. Ontario & Western; Rutland; Bangor & Aroostook and six light U. S. R. A. "mikes" of the Maine Central, subsequently returned over to them after 1920. The west end of the road would have been a rail fan's paradise for taking pictures—had it been permitted. After the war, all of these engines were returned to their owners. Traffic had diminished and the New Haven was able to handle it with their own locomotives.

In 1918, the Schenectady Works delivered fifty of the Santa Fe type, road Nos. 3200-3249, Class L-1. These engines with 30x32" cylinders, 63" drivers, weight of 360,730 lbs., carried 200# pressure and developed 77,800 lbs. tractive effort. At first, these engines were assigned such portions of the road as their weight and clearance permitted. They came equipped with Boyer speed recorders with strict orders they were not to be run faster than 35 mph. That lasted about one timetable. The road never did solve the wedge problem. Put them up where they should be, the engine rode like a bucking broncho; ease off on them and they'd pound the rod bushings to pieces. Whether this was due to improper counterbalances in the drivers, it is impossible to state at this late day. They were a source of grief and finally they were all herded together and placed in Cedar Hill-Maybrook service. Most of the engines of this group were subsequently furnished with feedwater heaters, thermic syphons and type "E" superheaters.

In 1919 came ten of the light Mountain USRA 4-8-2 type locomotives from the Richmond Works. Numbered 3300-3309, Class R-1, these engines with 27x30" cylinders, 69" drivers, weight 327,000 lbs., carried 200# pressure and developed 53,900 lbs. tractive effort. These engines were assigned Shore Line freight service and they did everything and more that was asked of them. Nos. 3310-3339, Class R-1a were received from the Schenectady Works in 1920. Nos. 3335-3339 were equipped with feedwater heaters. The tube nest was placed under the boiler, behind the cylinder saddle. Tests run on one of these locomotives indicated a high degree of heat of the water pumped into the boiler but it was felt that better results would be obtained if the tube nest was placed higher up—on the smoke box. These tests were the means of placing the familiar "thermos bottle" on the front of the smoke box—a familiar sight for many years. All of the other engines were subsequently reclassified as R-1b. Nine more engines, Nos. 3340-3348 were delivered in 1924. These engines were not only the mainstay in freight service but they could and did perform equally well in passenger service.

Altho' the slip switches prevented their entrance into the South Terminal in Boston, they were used on the heavy passenger trains that went through the Worcester gateway for State of Maine points.

In 1924, the Schenectady Works delivered No. 3500, 4-8-2 type, Class R-2. This was in the nature of an experimental locomotive and dubbed the "Mayflower." In the main, the details of the USRA locomotives were followed but it had the McClellan watertube firebox and an experimental front end. The locomotive weighed 360,700 lbs., carried 250# pressure and developed 67,200 lbs. tractive effort. In 1926 the Schenectady Works delivered Nos. 3501-3507, Class R-2a and based on the "Mayflower" design. However, these engines subsequently had their cylinders bushed to 25", boiler pressure was 265# pressure which gave these engines a tractive effort of 61,200 lbs. It seemed almost impossible to devise anything to prevent the cold air leaks through the firebox tubes and over the top of the fire with the McClellan firebox and all eight of these engines were rebuilt with radial stay type of fireboxes.

In 1926 the road was bitten with the three cylinder type of locomotive. True, in 1924 the road had received ten three cylinder engines of the 0-8-0 type but these engines in yard service did not readily show the defects in road service. Nos. 3550-3552 came from Schenectady in 1926, Class R-3 and Nos. 3553-3562, Class R-3a were delivered in 1928. All had (3) 22x30" cylinders, 69" drivers, weighed 374,700 and 379,700 lbs. respectively, carried 265# pressure and developed 71,000 lbs. tractive effort. When these engines were in top shape they would do a wonderful job on either the Shore Line or the Maybrook route. We know that three and four cylinder engines have been successfully used in England and on the continent. We know they were successful on the Philadelphia & Reading—see Bulletin No. 97. Either this design, as put forth by the builder was wrong or else it was a case of "out of sight—out of mind." The cost of maintaining these engines as compared to the others of this type was excessive and, altho' the road contemplated rebuilding them to two cylinder locomotives, even this was given up because of the cost. These were the last engines of this type received by the road and, had the management stuck by the USRA design, added such devices as would have improved their performance, they would have been far better off.

In the matter of switching locomotives, in 1920 the road received ten eight wheel switchers of the USRA design. Numbered 3400-3409, Class Y-3, these engines with 25x28" cylinders, 51" drivers, weight 216,600 lbs., carried 190# pressure and developed 55,360 lbs. tractive effort. In 1922 the road ordered twenty more and altho' these were lettered for the Central New England and numbered 13-32, the New Haven rented them for their own use. These engines weighed 219,000 lbs. and were subsequently renumbered NH 3420-3434 and 3415-3419. Five more were received in 1923 from Schenectady, road Nos. 3410-3414 and all of these engines turned in a good performance.

The first group of three cylinder locomotives were ten 0-8-0 switchers, Nos. 3600-3609, Class Y-4, delivered by the Schenectady Works in 1924. These engines had (3) 22x28" cylinders, 57" drivers, weighed 247,000 lbs., carried 200# pressure and developed 60,600 lbs. tractive

effort. Nos. 3610-3614, class Y-4a, similar in all respects, were delivered in 1927. The first group of engines were delivered with Vanderbilt tenders. These had a larger capacity than those used in road service and the road removed them from these switchers and placed them in that service shortly after delivery. These switchers were used in hump yard service at Cedar Hill and elsewhere and it was perhaps these three cylindered locomotives showed up so well in this service that it led the management to order the three cylinder locomotives of the Mountain type. So far as I know, there was never any talk of rebuilding these engines with two cylinders and, in general these engines performed well.

In retrospect, and in so doing we must remember it is far easier to criticise at a subsequent date than at the time of the event, let us assume that the New Haven, so far as its motive power was concerned, was a well equipped road at the close of 1903 and, in that assumption, we won't be far wrong. The A-1 and A-3 engines were having difficulty with some of the Shore Line trains and the G-4a (4-6-0) class received from 1904-1907 were necessary to replace them. They in turn were succeeded by those of the Atlantic and Pacific types delivered in 1907. However, the F-1 Atlantics were outmoded by 1913 and the six Baldwin Pacifics, designed to replace them were far from satisfactory. Thus, from 1907-1913, the road received 88 Pacific and 12 Atlantic type locomotives. In 1916 came the fifty I-4 engines and these handled the best and heaviest passenger trains for many years. The road spent much money in modernizing them. Their frames would not carry much more weight and, with the addition of the pump for the feedwater heater, it was necessary for the air reservoirs to be placed on top of the boiler, thus disfiguring an otherwise handsome locomotive. Whether the road showed wisdom in giving these I-4 engines so much and the I-1 and I-2 classes so little or whether new engines should have been purchased, is open to debate. Had the ten Hudson type engines been ordered earlier, they would have given longer service but between the years 1904 and 1916, practically all of the new engines were for passenger service and none for that service were purchased between 1916 and 1937 when these Hudsons were delivered.

In 1907, the road ordered forty more Moguls, Class K-1b, thus bringing the total number of that class to 240. These were good engines, they would handle almost as many cars and tons as the P-1 Consolidation class built in 1895 but, they would move their tonnage faster. The road assumed, in those days of wooden cars, that these engines were ample for their needs. No one could have foreseen the circumstances leading up to World War I and altho' we did not enter that war until 1917, the increased traffic brought about by this conflict and prior to our entry brought home forcibly the shortage of freight power. There were nearly 100 locomotives rented by the New Haven or the C. N. E., mostly of the Consolidation type, that could be found in service on this road by 1916. One might wonder if the forty Moguls ordered in 1907 might well have been of a more powerful type, such as the Consolidation for the P-1 engines of 1895 were nothing to brag of. The New Haven never ordered any more locomotives of this type after 1895. The thirty Mikado

engines delivered in 1916 only afforded a partial relief in the movement of this heavy traffic.

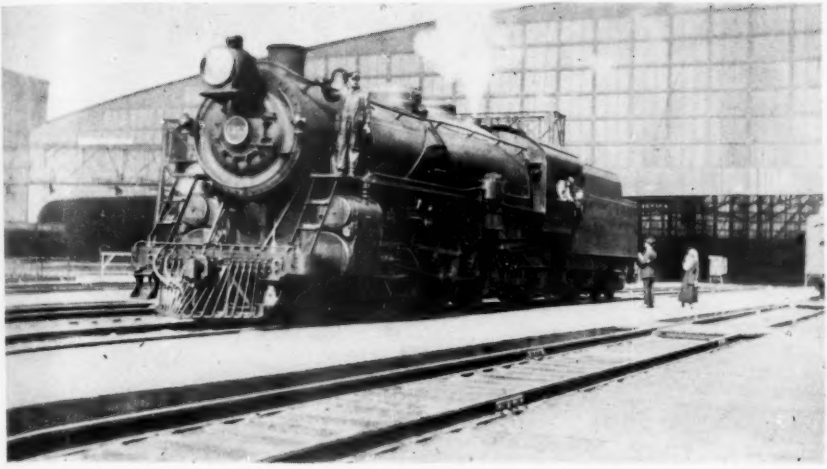
Mr. E. J. Pearson became President in 1917 and, coming from a western road, saw the advantage of moving heavier trains with larger power. The fifty Santa Fe (2-10-2) type locomotives, were a step in the right direction but the USRA light Mountain type engines outperformed the Santa Fe engines on the Shore Line and elsewhere. These dual purpose engines turned in a fine performance, save those with the three cylinders.

Looking back over the years, the New Haven had some outstanding locomotives, for the time in which they were developed, as found in their Classes A-1, A-3, G-4a, K-1, I-2, I-4, I-5, R-1 and Y-3. Others may not have equalled their performance but, in this respect I don't know of any railroad that has not, at one time or another, had a group of locomotives that did not come up to expectations. Good engines are produced only by the experience of those that have been previously produced, whether they have been a success or a failure and, take it by and large, the New Haven had more than had its share of those that were good as well as some of those that did not come up to expectations.

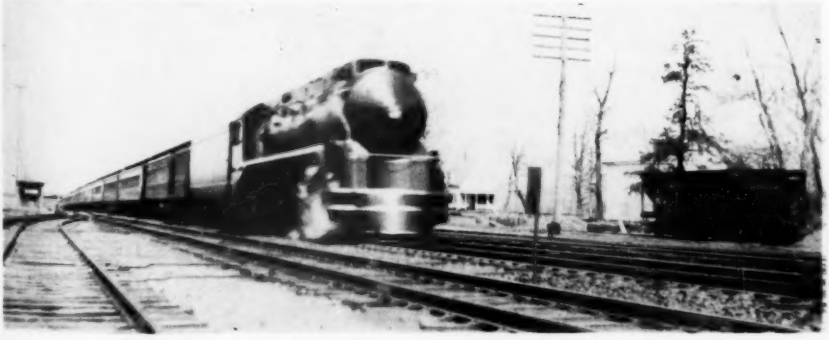
Steam Locomotives of the New Haven R. R.—1900-1937

The following is a list of steam locomotives delivered to the N. Y. N. H. & H. R. R. from 1900 to 1937 when the last lot of steam locomotives were received:

260- 264	2-6-0	K-1b	Baldwin	Various	1907	20x28"	63"	153000
285- 299	2-6-0	K-1b	Cooke	43135-49	1907	20x28"	63"	156000
300- 309	2-6-0	K-1c	Rhode Island	25600-9	1902	20x28"	63"	154000
310- 324	2-6-0	K-1c	Rhode Island	27027-41	1903	20x28"	63"	154000
325	2-6-0	K-1b	Schnectady	5446	1900	14&26x28"	63"	157000
326- 350	2-6-0	K-1b	Schenectady	31008-032	1905	20x28"	63"	150000
351- 370	2-6-0	K-1b	Rhode Island	Various	1904	20x28"	63"	151000
371- 390	2-6-0	K-1b	Rhode Island	28877-96	1903	20x28"	63"	152000
391- 395	2-6-0	K-1b	Rhode Island	29191-5	1903	20x28"	63"	152000
396- 419	2-6-0	K-1b	Schenectady	5422-5445	1900	20x28"	63"	151000
420- 434	2-6-0	K-1b	Schenectady	31033-047	1905	20x28"	63"	150000
435- 479	2-6-0	K-1b	Baldwin	Various	1905	20x28"	63"	153000
800- 819	4-6-0	G-4a	Baldwin	Various	1904	21x26"	73"	151000
820- 844	4-6-0	G-4a	Baldwin	Various	1905	21x26"	73"	151000
845- 849	4-6-0	G-4a	Baldwin	Various	1907	21x26"	73"	151000
858- 859	4-6-0	G-4b	Baldwin	Various	1904	15&25x26"	73"	161000
950- 969	4-6-0	G-3	Rhode Island	Various	1904	19x26"	57"	126000
1000-1008	4-6-2	I-1	Schenectady	41705-13	1907	22x28"	73"	216000
1009-1029	4-6-2	I-1	Baldwin	Various	1907	22x28"	73"	216000
1030-1031	4-6-2	I-1	Schenectady	49094-5	1910	22x28	73"	232000
1090-1095	4-6-2	I-3	Baldwin	Various	1913	24x28"	79"	246000
1100-1111	4-4-2	F-1	Schenectady	41714-25	1907	21x26"	79"	185000
1200-1209	4-4-0	A-3	Rhode Island	25590-9	1903	20x26"	78"	135000
1210-1214	4-4-2	A-3	Schenectady	5457-5461	1900	20x26"	78"	135000
1250-1264	4-4-0	A-1	Rhode Island	28535-49	1903	20x24"	73"	131000
1300-1349	4-6-2	I-2	Brooks	53371-420	1913	24x28"	73"	251500
1350-1399	4-6-2	I-4	Schenectady	56104-53	1916	26x26"	79"	266000
1400-1409	4-6-4	I-5	Baldwin	61964-73	1937	22x30"	80"	365300
1525-1549	4-4-0	C-3c	Rhode Island	28510-34	1903	18x24"	69"	112000

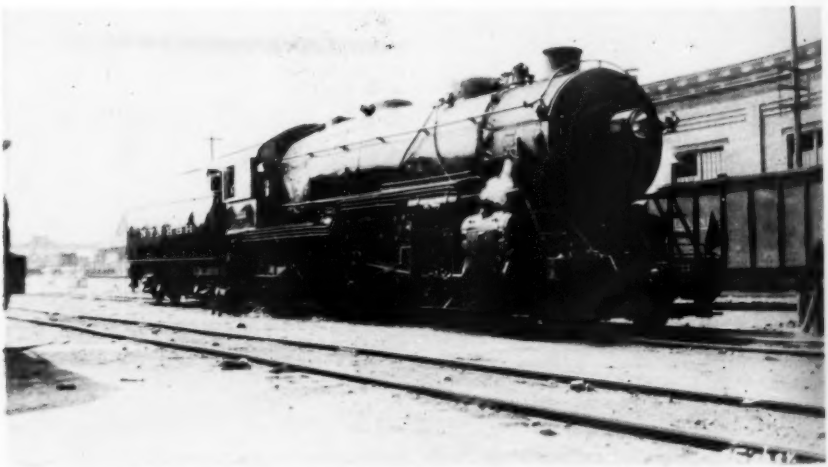


A new locomotive starts in Shore Line Service at Boston. New Haven #1353, Schenectady, 1916, I-4. 26x28" 79" 265800.

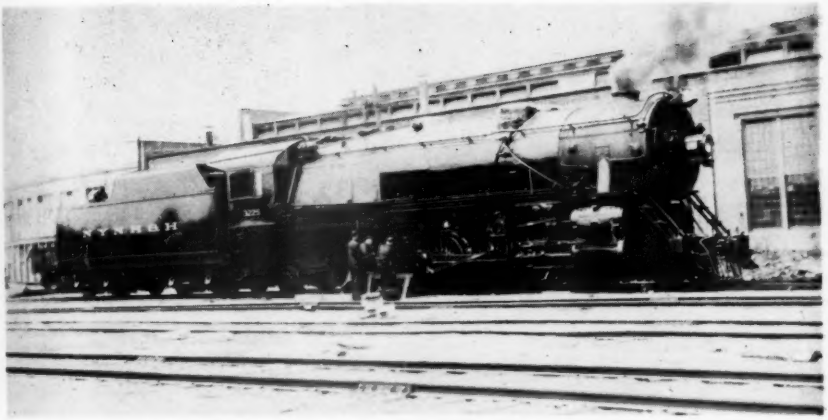


New Haven #1402 passing Sharon Heights, Mass., on the "Senator." Baldwin, 1937, I-5. 22x30" 80" 365800.

New Haven #3007 at Readville, Mass. Schenectady, 1916, J-1. 25x30" 63" 251750.



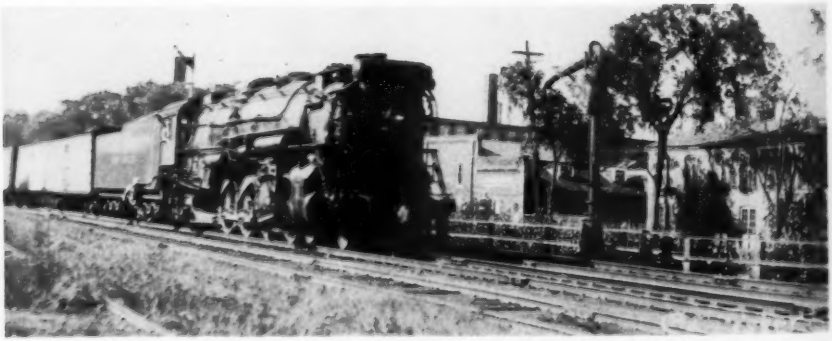
New Haven #3104 at Readville, Mass. Schenectady, 1916, J-2. 26x32" 63" 309600.



New Haven #3225 at Readville, Mass. Schenectady, 1918, L-1. 30x32" 63" 359140.

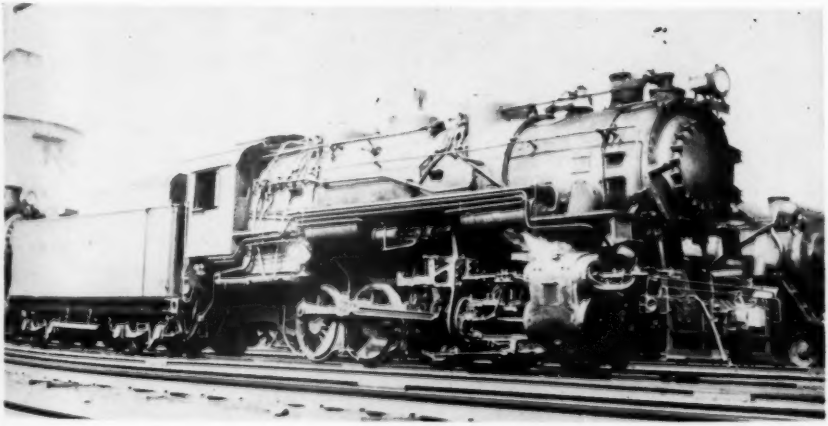
New Haven #3241 at Botsford, Ct. Schenectady, 1918, L-1a. 30x32" 63" 359140.

New Haven #3314 at New Milford, Ct. Schenectady, 1920, R-1b. 27x30" 69" 334000.



New Haven #3502 at Shelton, Ct. Schenectady, 1926, R-2a. 27x30" 69" 363200.

New Haven #3553 at Ayer, Mass. Schenectady, 1928, R-3a. (3)22x30" 69" 374700.



From Yungmeyer Collection

New Haven #3602 at New Haven, Ct. Schenectady, 1924, Y-4. (3)22x28" 57" 247000.

2300-2309	0-6-0	T-1	Rhode Island	25610-9	1902	20½&31x26"	51"	136000
2310-2319	0-6-0	T-1	Schenectady	5447-5456	1900	20½&31x26"	51"	136000
2325-2334	0-6-0	T-2a	Rhode Island	29221-30	1904	19x26"	51"	132000
2335-2343	0-6-0	T-2a	Rhode Island	29380-8	1904	19x26"	51"	132000
2373-2379	0-6-0	T-2b	Rhode Island	37680-6	1905	19x26"	51"	135400
2380-2394	0-6-0	T-2b	Rhode Island	30922-36	1905	19x26"	51"	135400
2395-2399	0-6-0	T-2b	Rhode Island	30994-8	1905	19x26"	51"	135400
2400-2434	0-6-0	T-2b	Rhode Island	42951-85	1907	19x26"	51"	138000
2435-2444	0-6-0	T-2b	Cooke	48164-73	1910	19x26"	51"	141000
2445-2469	0-6-0	T-2b	Cooke	53421-45	1910	19x26"	51"	141000
3000-3024	2-8-2	J-1	Schenectady	55695-719	1916	25x30"	63"	251750
3100-3107	2-8-2	J-2	Schenectady	55720-7	1916	26x32"	63"	325000
3200-3249	2-10-2	L-1	Schenectady	57891-940	1918	20x32"	63"	368000
3300-3309	4-8-2	R-1	Richmond	59790-9	1919	27x30"	69"	333200
3310-3339	4-8-2	R-1a	Schenectady	62205-34	1920	27x30"	69"	334000
3340-3348	4-8-2	R-1b	Schenectady	64937-45	1924	27x30"	69"	334000
3400-3409	0-8-0	Y-3	Schenectady	62374-83	1920	25x28"	51"	216000
3410-3414	0-8-0	Y-3	Schenectady	64947-51	1923	25x28"	51"	219000
3415-3419	0-8-0	Y-3	Schenectady	63457-61	1922	25x28"	51"	219000
3420-3434	0-8-0	Y-3	Schenectady	63400-14	1922	25x28"	51"	219000
3500	4-8-2	R-2	Schenectady	64946	1924	27x30"	69"	360700
3501-3507	4-8-2	R-2a	Schenectady	66545-51	1926	27x30"	69"	363200
3550-3552	4-8-2	R-3	Schenectady	66552-4	1926	(3)22x30"	69"	374700
3553-3562	4-8-2	R-3a	Schenectady	67227-36	1928	(3)22x30"	69"	379700
3600-3609	0-8-0	Y-4	Schenectady	65338-47	1924	(3)22x28"	56"	247000
3610-3615	0-8-0	Y-4a	Schenectady	67394-9	1927	(3)22x28"	56"	247000

Tyrone Division

By C. C. Edmiston, Sr.

"Here mountain on mountain exultingly throws,
Through storm, mist and snow, its black crags to the skies;
In their shadows the sweets of the valley repose,
While streams, gay with verdure and sunshine, steal by."

Tyrone, situated at the confluence of the Little Bald Eagle Creek with the Little Juniata River, is the junction-point of the Tyrone Division with the main line of the Pennsylvania Railroad, and is the only flourishing town between Harrisburg and Altoona which grew out of the construction of the latter. It has grown into importance by being the outlet of the region traversed by the former. Its altitude is 892 feet above the sea level. It lies in a basin formed by the base line of old Tussey, a famous mountain, and the bold ridge known as the Bald Eagle Mountain, and is well and most delightfully located for business, residence, and health purposes. It was viewing the future of the region from this point that Herman Haupt, then General Superintendent of the Pennsylvania Railroad, in the fifth annual report made to the Board of Directors on January 1, 1852, said:

"From Tyrone to Bell's Mills, a distance of about ten miles, the line of the Pennsylvania Railroad runs parallel to the main ridge of the Allegheny Mountains, and within about ten miles of the vast timber region of Clearfield and adjacent counties which lie on the small tributaries of the Susquehanna. The ravines which penetrate the slope of the mountain afford facilities for the construction of roads connecting this region with the Pennsylvania Railroad, the most favorable of which are at Bell's Run, Tipton's Run and Tyrone. At Tyrone the railroad is located on a side hill of considerable inclination, which is unfavorable for an extended lumber business, as the proximity to the track and the danger of fire would be too great. At Bell's Mills and Tipton's Run, and particularly at the latter point, sidings can be constructed on level ground at right angles to the direction of the road, and extended to any distance that may be required for the protection of this species of property. New towns will, no doubt, spring up at both these points. Tyrone City is another new town which is rapidly increasing, and will derive a large amount of business from the Glen Hope turnpike, the Philipsburg turnpike, and the plank road to Milesburg, at the head of the Bald Eagle navigation."

The roads connecting the then "back country" regions with the Pennsylvania Railroad have found their best connection at Tyrone, and the Pennsylvania and North Western Railroad, which connects at Bellwood, and the Tipton Branch at Tipton, fully realize Mr. Haupt's idea.

The Division is made up of the Tyrone Branch, Bald Eagle Valley Railroad, Lewisburg and Tyrone Railroad, and the Tyrone and Clearfield Railway, with their many branches, and has 339 1/3 miles of track, divided as follows:

ROAD	FIRST TRACK	SECOND TRACK	COMPANY SIDINGS	TOTAL TRACK
Tyrone Branch	3.15	1.82	17.79	22.76
Bald Eagle Valley Railroad	80.63	—	20.46	101.09
Lewisburg and Tyrone Railroad	27.24	—	1.85	29.07
Tyrone and Clearfield Railway	134.07	12.38	41.13	187.58
Total, Tyrone Division	245.09	14.20	81.21	340.50

The Bald Eagle Valley Railroad Company was organized March 25, 1861, under an Act of Assembly of the Pennsylvania Legislature, approved March 25, 1861. It is a consolidated company, and formed of the Bellefonte and Snow Shoe Railroad Company, which was incorporated under the name of the Allegheny, Bald Eagle Railroad, Coal and Iron Company, June 12, 1839. This name was changed to Bellefonte and Snow Shoe Railroad Company, March 24, 1859—the Moshannon Railroad Company, incorporated April 11, 1863, and the Bellefonte, Nittany and Lemont Railroad Company, organized September 11, 1883, under an Act approved April 4, 1865. The consolidated company is leased to the Pennsylvania Railroad Company under a lease dated December 7, 1864, for 99 years.

The Lewisburg and Tyrone Railroad Company was organized December 31, 1879, under the terms of an Act of Assembly approved April 8, 1861, and is leased to the Pennsylvania Railroad Company for a term of 99 years from the first day of January 1880.

The Tyrone and Clearfield Railway Company was organized April 1, 1867, under the authority of an Act of Assembly of April 8, 1861. The Moshannon and Clearfield Railroad Company was consolidated with it on May 23, 1884. This latter company was organized June 8, 1880, under an Act of April 4, 1868. The consolidated companies are leased to the Pennsylvania Railroad Company for 50 years, from January 1, 1882.

The Bald Eagle Valley and the Tyrone and Clearfield Roads were known as "commuted roads," having been aided in their construction by the Pennsylvania Railroad Company, under the provisions of the Act of Assembly approved March 7, 1861, for the commutation of tonnage duties. The lease of the Bald Eagle Valley was made during the war of the Rebellion, and hastened no doubt by the weakness of the Pennsylvania Railroad from a military standpoint. At any minute the line of communication was likely to be cut by a Confederate dash, and the burning of any one or more of the many bridges on which the road crosses the Juniata between Tyrone and Duncannon. The lease of the Bald Eagle Valley gave an eastern connection at Lock Haven and a line too far north to be imperilled.

The region from Tyrone to Bellefonte is one of great interest and beauty. Between rugged mountains of imposing grandeur lie charming valleys of exceptional luxuriance, irrigated by many springs of rare purity, which, gushing forth from the base of the mills, feed the Bald Eagle Creek. Being rich in its deposits of iron-ore, and having a boundless wealth in lumber, stone, bituminous coal, and fertile fields brought

to a high state of cultivation by its thrifty farmers, it presents a picture of prosperity seldom equalled.

The Pennsylvania Railroad Company began operating the Bald Eagle Valley Railroad from Tyrone to Milesburg and Bellefonte January 1, 1863. The road was completed and put in operation from Milesburg to Howard in August 1864. From Howard to Lock Haven it was turned over to the Company on December 1, 1864; but, not being in condition, it was not put into operation until May 1, 1865. The Tyrone and Clearfield Road was extended to Clearfield in 1868, but not opened for use until February 1, 1869. It was opened to Curwensville December 24, 1874. The first Superintendent of the Division was James Lewis; he was succeeded on April 1, 1867, by George C. Wilkins, who, in turn, was succeeded on November 1, 1873, by Samuel S. Blair and J. K. Johnson 1903-1929. Division now abolished.

Spencer S. Bullis

By C. F. H. Allen

The story of most business enterprises is largely the story of the men behind them. This was especially true in the railroad era when the great expansion in organization and building of these roads took place. All activity was by no means limited to Wall St., New York, or State St., Boston. As has become evident from the published histories of many of these small roads in western New York and Pennsylvania, there were local men of stature who had the vision to see the possibilities and who devoted thought, time, and energy to their construction. One of them was Spencer Seth Bullis, formerly of Olean (Bull. No. 76, p. 61).

Biographical material concerning Mr. Bullis was very scanty, however, and the causes for certain of his activities were unknown. I have been fortunate in locating his son, Raymond S. Bullis, and obtained from him reminiscences of his father's business activities, and a few other biographical data. On account of their interest to our members I am pleased to make them available. In particular, explanations are given (1) about the exchange, with the Goodyears, of the Buffalo, Attica and Arcade for the Bradford, Bordell and Kinzua (Bull. No. 78, p. 75), (2) how Mr. Bullin became involved with the Gulf and Ship Island, and (3) how he happened to move to the west coast. The reminiscences follow:

My father, Spencer Seth Bullis, was born in Erie County, New York near East Aurora July 7, 1849. I do not know much of his boyhood and young manhood days as Father was a very active man most of his life and did not talk much about his early life. I assume that he attended the local country school and, was told, he also went to an Academy at Fort Edward, New York. Father was a good speller; used the method of speaking the syllables and then spelling them. I remember two things he told of doing. One, that of teaching school and the other working in the Pennsylvania oil field; both for short periods. Any thing he started before entering into the lumber business must not have been for long as he married my mother at twenty-four and at that time was in the saw mill business.

For a career, Father looked to the lumber industry though there were those at that time, the 1870s, who told him that lumber would soon be out due to the exhaustion of the timber supply. I understand he made his start by selling lumber products in Buffalo, N. Y., but soon got into the saw-mill operating end. How the mills were financed, I do not know, but believe it was largely thru loans from Buffalo banks. One story Father told was that once when he was interviewing a Buffalo banker, the banker asked him "Spence, how many hours a day are you working?" Father replied "About eighteen." To which the banker

remarked "When are you going to learn how to work?" I think loans in those days were obtainable on the banker's judgment of borrower's character and reputation and 100% collateral was not required.

I do not know locations of the mills, except the one where I was born on February 12, 1881. This mill was located at Bullis Mills, Penna., P. O. on the now Pennsylvania Railroad, Buffalo Division, where the railroad crosses from Pennsylvania into New York State. Father's operations were in the hemlock timber stands of Northwestern Pennsylvania and, I believe, had the usual "Ups and Downs" of the business. One story, I remember hearing, was that one of his early mills caught fire in the evening and that when Father saw that nothing could be done to save it he went home to be met by worried Mother asking "What CAN we do?" to which Father was reported to have said "Nothing if I don't sleep" and went to bed. That was very characteristic of Father. He did not let adversities crush him but soon was started on a new venture to replace the one that had failed.

Lumbering with its logging railroads led Father into the railroad business itself. The practice developed of placing the mill back in the woods and then, I believe, the logging railroad got a small portion of the thru freight rate for its haul of the lumber. One of such woods railroads I recall as being named Allegheny & Kinzua. I do not know its location but I do recollect a Decoration Day picnic ride over it and after the picnic the party attended a base ball game at Bradford between the teams of that city and Olean of the Iron and Oil League, I believe was the name.

In 1895 Father entered into a contract with a Massachusetts man for development of a land, railroad and harbor project in Mississippi. This man owned a block of land which included the then unoccupied townsite of Gulfport on Mississippi Sound and the railroad was the Gulf & Ship Island R. R. The railroad had been planned to be built from the Coast up thru the center of the State; some grading had been done but work had been abandoned for about ten years. Route of the proposed railroad was thru a fine stand of virgin yellow pine a good portion of the way. Father recognized the possibilities of the road and succeeded in interesting a small group of men of Western New York and Pennsylvania to organize the Bradford Construction Co. with him as General Manager to put over the project. Construction was quite rapid and when completed there was 160 miles of main line track: Gulfport to Jackson, the Mississippi State Capital, with 90 miles of branch lines, one to Columbia, Miss. and one to Laurel, Miss. together with adequate sidings, rolling stock, shop buildings, etc., needed for a full operation. Trunk Line connections were the Louisville & Nashville R. R. at Gulfport, the New Orleans & Northeastern R. R. (Southern Railway) at Hattiesburg and the Illinois Central R. R. at Jackson. At Gulfport, about a mile of railroad pier was built into Mississippi Sound so that freight cargoes could be transferred direct between car and ship. Under a contract with the Rivers and Harbors Committee of the United States Congress a ship channel of 19 feet depth was

dredged from this pier head to Ship Island Anchorage Basin on the Gulf of Mexico; a small portion of the expense was paid by the United States Government. Business of the railroad and harbor developed rapidly. I have a booklet issued by the railroad, March 1901, which lists 77 lumber manufacturers and 37 Naval Stores manufacturers as located on the railroad. Father disposed of his interest in the Gulf & Ship Island R. R. in 1901 to one of the original partners in the Bradford Construction Co. who had already bought out the other partners. Some years later the road was sold to the Illinois Central Railroad.

Again, I cannot say how or when Father acquired control of the Buffalo, Attica and Arcade Railroad with its approximately 30 Miles of standard gauge track and equipment. This trackage, all in Wyoming County of New York State, extended from Arcade Village on the Pennsylvania Railroad to Attica on the Buffalo Division of the Erie Railroad thru a dairy and farming country. Though he had had no business interests in Olean for a considerable time Father had maintained the family home there. When I came home in June 1901 on a vacation from the Gulf & Ship Island R. R., I found that Father was planning on building an extension of the B. A. & A. R. R. from Java Center into Buffalo so I resigned my job in Mississippi and stayed with Father. However, the bonds for financing this project were not sold and, though some grading had been done, the scheme was dropped and the old line continued on in the even tenor of its way and I with it.

After dropping that project in New York State, Father again turned to Mississippi. This time he became interested in electric public utilities in Vicksburg and Natchez, lighting, power and street railway. These interests proved profitable and Father kept them until about 1910 when he sold hem to the Dawes interests of Chicago, Ill.

About 1905, the Buffalo & Susquehanna Railroad, which was controlled by the Goodyear Brothers of Buffalo, N. Y., was planning an extension into Buffalo and it developed that their proposed route would follow a portion of the right-of-way owned by the Buffalo, Attica and Arcade R. R. Also, at that time the Goodyear Brothers owned the Bradford, Bordell & Kinzua R. R., a narrow-gauge line operating between Bradford, Penna. and Kane, Penna. In order to further their Buffalo & Susquehanna plans the Goodyears made a deal with Father by which their B. B. & K. line was "swapped" for Father's B. A. & A. line. However, the B. & S. R. R. plans were not carried thru and the B. A. & A. R. R. finally wound up in the hands of a group of local shippers who are still operating it under the name of the Arcade & Attica Railroad.

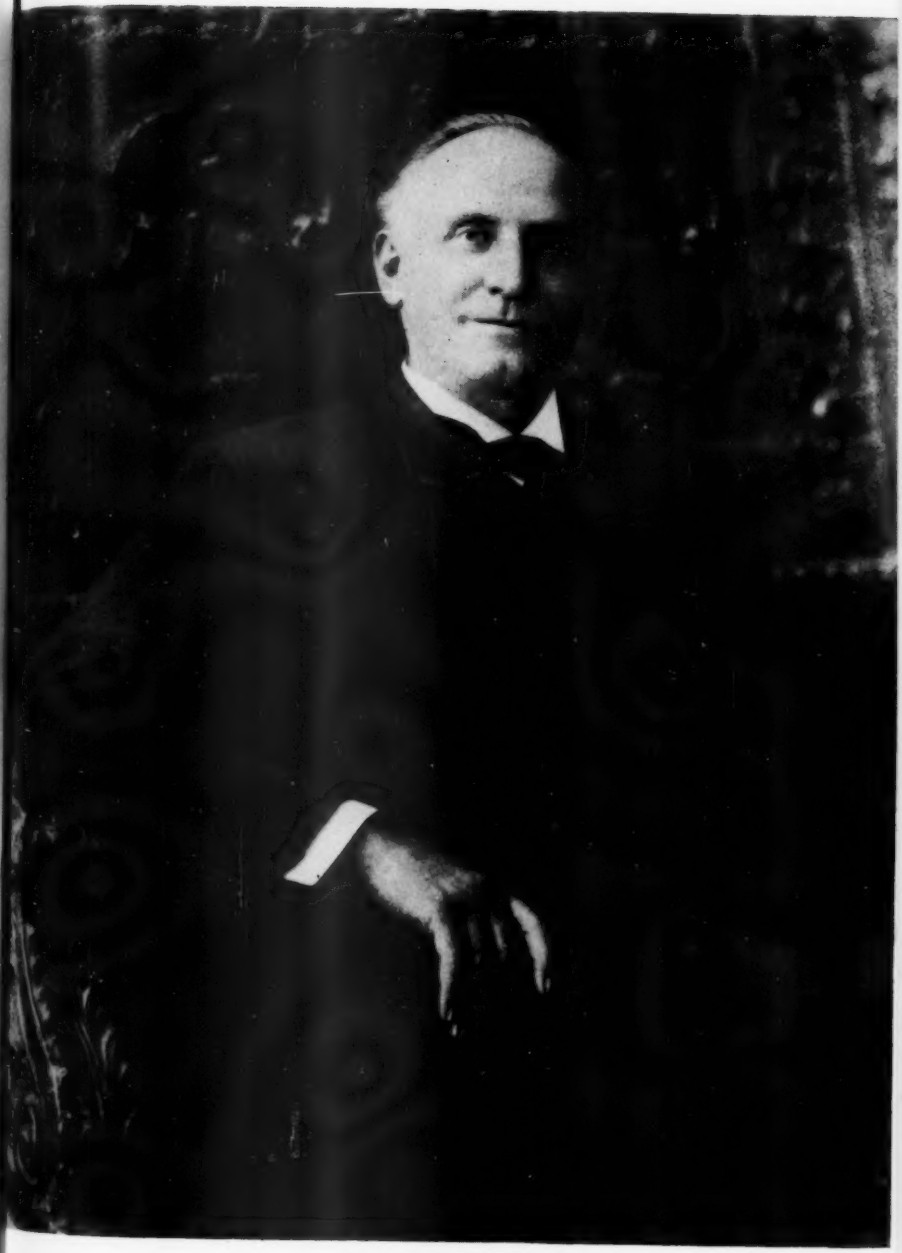
The B. B. & K. R. R. had played an important role in the historic Bradford Oil Field. In addition to its line to Mt. Jewett, Penn. and Kane, Penna. it had had its own line into Smethport, Penna. and for a time also operated the Baltimore & Ohio RR narrow-gauge line between Kane and Foxburgh, Penna. But in 1905 it was operating train service between Bradford and Kane only. Two corporations, both under the same ownership, owned the track to Mt. Jewett, Pa. and from there the operation was on a lease basis over trackage owned by the Baltimore

& Ohio R. R.; line from Bradford to Ormsby, Penna. was the BB&K and from there to Mt. Jewett it was the Big Level & Kinzua R. R. At Bradford the passenger trains departed from the Erie Railroad station but the Company had its own round house and a combined office and freight depot. Mt. Jewett was a joint agency of all railroads entering the town; namely Erie, Buffalo, Rochester and Pittsburg, Kushequa Route and the B. B. & K. and all used the passenger and freight depot of the Erie Railroad. Narrow-gauge steam locomotives and cars were used and good schedules were maintained. At Bradford was located a "hoist" which enabled the Company to change standard-gauge trucks of some types of freight cars to narrow-gauge ones so that the car with its load could go forward to points on the B. B. & K. or vice versa without change of cargo. This was accomplished by pulling the car, with its body suspended on dollies running on special rails alongside, over a stretch of depressed track. As the car body was pulled horizontally along the standard trucks followed the depression and dropped out of the king pin and at the other end of the pit the pin was settled into the narrow-gauge trucks and thus the transfer was made. This operation took very little time.

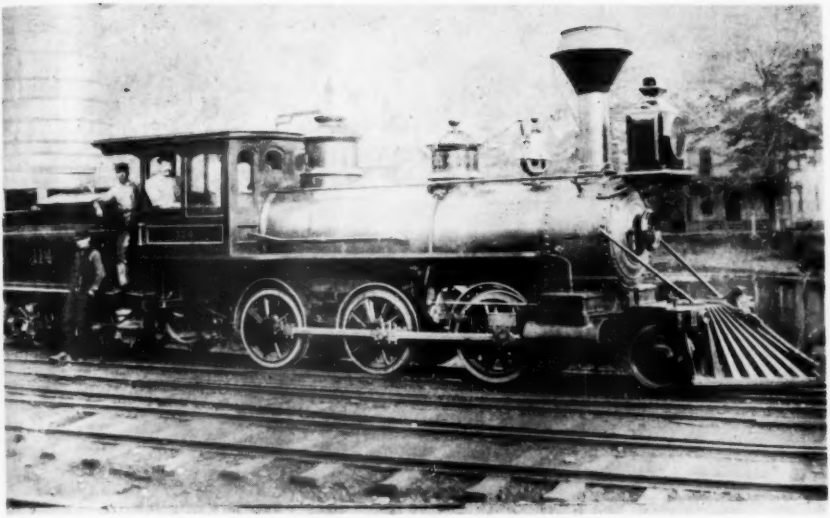
The Buffalo, Rochester & Pittsburg tracks crossed those of the B. B. & K. and BL&K in two places; one near Bradford and the other on the Big Level out of Mt. Jewett. The B. B. & K. had the prior right at each crossing. Of course the crossings were a great nuisance and expense to the B. R. & P. in the operation of their heavy trains and they were eager to have them done away with. At the same time the local business of the B. B. & K. between Bradford and Mt. Jewett was very light. These conditions made feasible a deal under which the B. B. & K. sold its crossing rights to the B. R. & P. which, of course, meant the abandonment of that portion of the B. B. & K. operation. The rails between Bradford and Mr. Jewett were taken up and sold together with equipment not needed for the continuation of the Mt. Jewett to Kane operation. Thus was ended the Bradford career of the little train that for so many years could be seen leaving the Erie passenger station and then a short time later be seen, well up on the hillside opposite the station, disappearing around the point on its journey to Ormsby, Mt. Jewett and Kane.

For a few years, operating now as the Big Level & Kinzua R. R., train service was provided between Mt. Jewett and Kane. Close connections were made between its trains and those of the B. R. & P. at Mt. Jewett and thus good thru service was maintained to Bradford and B. R. & P. points.

The right-of-way and track of the Baltimore & Ohio R. R. ended a considerable distance from where a junction could be made with the tracks of the Erie and B. R. & P. and that space was owned by the Big Level & Kinzua Railroad. Thus, about 1910, when the Baltimore and Ohio decided to change their narrow gauge line from Foxburgh, Penna. thru Kane to a standard gauged one and make connection with the standard gauged lines at Mt. Jewett they bought Father out and took over the B. L. & K. rights-of-way and equipment. This deal ended

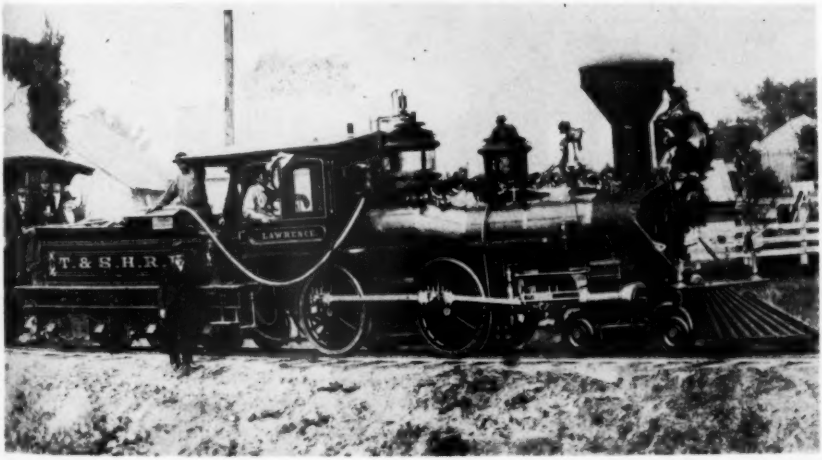


Spencer S. Bullis.

Courtesy of Robert C. Schmid

B. N. Y. & P. #14, ex O. B. & W. #7. Brooks #349, 1879.

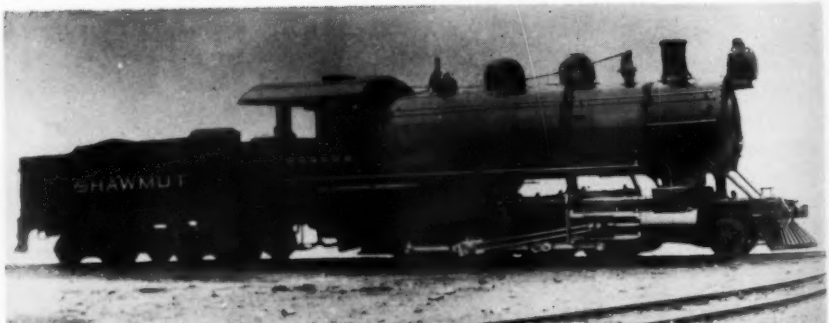


Courtesy of S. R. Wood

Toledo & South Haven #1, ex Bradford R. R. #14. Brooks #665, 1882.

Courtesy of Fred C. Hill

P. S. & N. #18, ex D. L. & W. #237. Dickson #111, 1872.



Courtesy of Baldwin L. W.

Built for the Shawmut but delivered to the Kansas City Southern R. R. Baldwin #22350, 1903.

the long and historic career of the Bradford, Bordell and Kinzua Route.

In 1937, a Mr. R. E. Davis of 23 E. Corydon Street, Bradford, Penna., wrote our family asking if we could send him any old papers, pictures, tickets, time-tables, etc., he could use in his private museum of BB&K history. We had nothing to send him but he had apparently collected considerable data on the subject from various sources. In a letter dated September 20, 1937, Mr. Davis gave me a list of equipment turned over at the time of the Big Level & Kinzua R. R. sale. This list, which I believe is correct, he said was made from a list of equipment the Baltimore & Ohio R. R. reported they had received. They reported receiving :—

2 engines	1 combination car
5 box cars	1 baggage car
5 flat cars	1 snow plow
2 passenger cars	4 sets Ramsey trucks

The engines were BB&K Nos. 7 and 10; No. 7 was a passenger engine and No. 10 a freight. Mr. Davis wrote, and I had heard it before, that No. 10 was built in 1881 for the Denver & Rio Grande R. R. and was purchased by the B. B. & K. in 1892 after they had had a fire which destroyed their shop and several engines. He further stated that No. 10 was sold by the B & O to the West Virginia Midland R. R. where it, too, gave good service and was not junked until a few years previous to his writing. These engines performed well for us and I do not recollect our having had an engine failure. I never met Mr. Davis and do not know whether he is still living.

After this Father's activities were in the Pacific Northwest. In 1912, while on a business trip to British Columbia, he was asked by a Bradford Bank to investigate an hydraulic placer gold mine located in Jackson County of Southern Oregon in which one of their clients was interested. This mine was the old Sterling Mine on Sterling Creek of the Applegate River section and had been idle for about four years because the operation had reached a point in the channel where they could not get enough head or fall from the water ditch to give the needed pressure at nozzle or "giant." The mine had operated for some thirty years using water brought from high up on the Little Applegate River by open ditch along the mountainside into the Sterling Creek valley. Father decided operations could be resumed and entered into the project. His plan was to drop a little water from the ditch at the high point where it entered Sterling Gulch onto a water wheel and generate electricity and take the power to the mine head and use it to run a centrifugal pump. This installation worked out well and gave plenty of pressure to the water as it left the six inch nozzle of the "giant." It was an expensive operation and the ground worked did not prove up to anticipated gold content. Too, the water and hence the work season was very short so after a couple of seasons the mine was again abandoned. At a later date another outfit tried to again operate but without success. The old balance scales that had been used in the

years of operation to weigh the gold are now displayed at the museum of Jackson County at Jacksonville, Oregon.

At the same time that this mining venture was in progress Father was going ahead with another Oregon venture. This time it was in line with some of his past activities. From his experience in the street railway business at Vicksburg, Mississippi he decided that Medford, Oregon offered an opening for the same kind of venture. In addition to the City line which he built he also took over and electrified a short steam rail line which ran from Medford to Jacksonville which was then the County Seat of Jackson County. Unfortunately times were changing rapidly. The electric railway got its start about the same time that automobiles and jitneys were becoming numerous with the result that the railway was not a paying proposition and had to be dismantled.

By this time Father was getting pretty well along in years but he still kept active in business deals, mostly in the lumber and timber line. But, after he was over seventy years of age he took on another activity of a line unfamiliar to him. At Medford, a fruit cannery had been started but went bankrupt. Father bought the plant, soon built a bigger plant on a new site and it continued on as a successful business.

I believe my foregoing reminiscences of some of Father's projects show him to have been an unusually vigorous business operator. He was blessed with good health and vast energy which he enjoyed using to its fullest extent in the enterprises he undertook; he always took a dominant part in them. I do not believe he went blindly into any of his deals but I think he always had a quick, keen grasp of their possibilities. I am proud to have been one of his sons. I am glad to note that Father was able to keep quite active right up to the time of his death from a stroke in December 1929 at the age of eighty years and some months."

The biographical data about Mr. Bullis's associates (Bull. Nos. 76, p. 62; 78, p. 75) are as follows: Gilbert P. (d. 1949) and Raymond S. Bullis were sons of S. S., the latter being the younger. At one time Gilbert kept a store at a mill and logging job on the Allegheny & Kinzua (Bull. No. 78, p. 81) where Raymond visited during a school vacation, and walked into Bradford from Sugar Run. Messrs. Bell, Jack, and Merrick were associates of S. S. in the Bradford Construction Co., that financed the building of the G & S I. Bell was president of the First National Bank of Bradford, and Jack was a lawyer. Others in the construction company were C. P. Collins and Capt. Joseph T. Jones, both oil men. These men came to Gulfport meetings of the G & S I. Jones subsequently bought out all his associates, and later sold to the Illinois Central. C. P. Cary (Bull. No. 80, p. 74) was an Olean lawyer.

In connection with the Buffalo, Attica and Arcade, Mr. Bullis recollected two items. "Every Saturday we used to pick up along the line, cheese for New York in a special car which was turned over to the Erie at Attica. Early the following week we would receive a postcard from the Cheese Freight Agent in New York City giving us the exact hour and minute the car arrived in New York; around 5:23 A. M. as I remember, Monday. The other incident was about an Annual Report

I made to the Interstate Commerce Commission. Two years after the report was filed we received a letter asking if they could change the fifth unit of a decimal one unit, because the sixth unit was more than 5. Their courteous request was granted!"

It may be noted here that the succeeding 28-mile Arcade and Attica was hard hit by floodwaters in the Jan., 1957, thaw. A couple of miles were washed away, and led to the abandonment of the northern end, 14 miles, from Java to Attica.

A little more information has come to light on a few locomotives of the McKean Cty. roads, included in this series of papers. Our member S. R. Wood located one Allegheny & Kinzua engine, No. 3, in the Brooks records. It was a 2-6-0 3′ 0″ gauge, Constr. No. 1370, 4-1888, 15x24, 38″; sold in 1889 to the Droney Lumber Co., and later, by them, to the Girard Lumber Co. Dr. Wood also supplied the picture of Toledo and So. Haven No. 1, "Lawrence," which was formerly Bradford RR No. 14. R. C. Schmid furnishd the picture of BNY&P No. 114. The badge plate giving the Brooks Construction number (349) appears to be homemade. If authentic, this would be the former OB&W No. 7. Member Fred C. Hill has made additional contributions relating to the PS&N. The photo of No. 52 is Baldwin Constr. No. 22350; this is one of the four engines that went to the Kansas City Southern, and not 23980 which stayed on the Shawmut. Although partially obscured, the construction number can be read clearly on the original photograph (7 ins. long). The whistle is on the engineer's side, while the Shawmut engines had them on the fireman's side. The picture of No. 57 (Bull. 96, p. 17) is mislabelled as 52. PS&N No. 2, the brass two-spot, was sometimes called "Mrs. Smith" and was originally equipped with a balloon stack.

Worth Reading

compiled by

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BOOKS AND PERIODICALS

Alabama—Coosa River System. An Analysis of the Interim Report of the Corps of Engineers, U. S. Army . . . dated July 1, 1958, by Special Sub-committee of Zone 14 Comm. on Waterways, Association of American Railroads. Dated Feb. 6, 1959. 17 p., fold. map. Free on request to Committee, 416 Transportation Bldg., Washington 6, D. C.

All Aboard, Mr. Lincoln! A Picture Story about Abraham Lincoln and the Railroads, by Bill Bunce. 16 p. Illus. Free on request to School and College Service, Association of American Railroads, 720 Transportation Bldg., Washington 6, D. C.

American Railroads—Their Growth and Development. 1958 ed. 32 p., Illus., Maps. Free on request to Association of American Railroads, Transportation Bldg., Washington 6, D. C.

The American Short Line Railroad Association. "Know Your Congress"—Legislative Policies . . . including Pictorial Directory of . . . 86th Congress [1st sess.]—*1959.* iv, 122 p., illus., ports. Free on request to the Association, 2000 Massachusetts Ave., Washington 6, D. C.

American Trucking Trends 1958—"1933-1958, Silver Anniversary of the American Trucking Associations." 33 p. Illus. Free on request to the Associations, 1424 Sixteenth St., Washington 6, D. C.

Aspects of Transportation Based on Regulatory Experience in the United States [1781-date] *A Paper delivered to the High Authority, European Coal and Steel Authority, Luxembourg, October 10, 1958,* by Howard Freas, [then] Chairman, Interstate Commerce Commission. Cover-title, 130 proc. l. Free on request to Commissioner Freas, Interstate Commerce Commission, Washington 25, D. C. as long as supply lasts.

British Railways Diesels—Winter 1958/59 Edition. 63 p. Illus. London, England, Ian Allan Ltd. 75 cents.

Budget Message of the President of the United States and Summary Budget Statements. M, 78 p. Statements variously paged. Accompanied Budget for fiscal year ending June 30, 1960. "Transportation and Communication" M46-M50. For sale by Supt. of Docs., U. S. Govt. Print. Off., Washington 25, D. C. $1.75.

The Channel Tunnel, by Humphrey Slater and Correlli Barett. viii, 213 p. Illus., London, Eng., Allan Wingate, Ltd., 12 Beauchamp Pl., S. W. 3. $3.75.

Cities in the Motor Age, by Wilfred Owen. 176 p. Illus. New York, The Viking Press, $3.95. "Roads, Rails and Renewal" Ch. 6.

Civil Engineering Handbook, 4th Edition, 1959. Leonard C. Urquhart, Editor-in-Chief. xi, Sections 1-10, separately p. [1184 p.],

Illus., Diagrs. New York [etc.], McGraw-Hill Book Co. $17.50. *Section 2. Railway, Highway, and Airport Engineering,* by John B. Babcock, 3d and Alexander J. Bone.

Containerization—The New Frontier in Transportation—A Panel Discussion . . . July 1958. ii, 77 p. Illus. Washington 5, D. C., Truck-Trailer Manufacturers Association, Inc. $1.00.

Directory of Railway Officials & Yearbook 1958-1959—64th Year of Publication. Compiled from official sources under the direction of The Editor of "The Railway Gazette." ii, 596 p. and adv. p. London, Eng., 33 Tothill St., Westminster, S. W. 1. 40 shillings. Historical sketches for the larger railroad systems, brief data on smaller lines in every country in the world. Summary of railroad mileages by continents and countries.

DA Distribution Age—Directory and Census of Physical Distribution Functions . . . 4 p. Philadelphia 39, Pa., Distribution Age Research Dept. 50 cents.

Early History of the Long Island Railroad 1834-1900, by Mildred H. Smith. 63 p. Illus. Uniondale, Long Island, Salisbury Printers. Price not stated.

Estados Unidos Mexicanos. SCOP. Memoria de la Secretaria de Comunicationes y Obras Publicas 1956-1957 1957-1958 y Resumen del Sexecio 1953-1958, by Ing. Walter C. Buchanan. Arranged in sections, each individually paged. Mexico, D. F., Mexico, Secretaria de Comunicaciones y Obras Publicas. No price stated.

"Featherbedding"—A List of References Arranged Chronologically 1938-1958, with Index of Authors. 19 proc. l. Free on request to A A R, BRE Library, Transportation Bldg., Washington 6, D. C.

"The Future of Coordinated Truck Service"—Address by J. L. S. Snead, Jr., Consolidated Freightways, Inc., to annual convention, California Trucking Associations, Inc., Coronado, Calif., Jan. 28, 1959. Cover-title [8] p. Menlo Park, Calif., Consolidated Freightways, Inc. Information Dept., 431 Burgess Dr. Free on request.

A Half-Century of Teamwork, 1908-1958, by P. Harvey Middleton. 78 p. Illus. Chicago 3, Ill., Railway Progress Institute. No price stated. ". . . the first half century of teamwork between the railroads and the railway equipment and supply industry. . . ."

Henry M. Flagler—Railroad Builder, by Carlton J. Corliss. Address at St. Augustine, Fla., Feb. 23, 1959 at unveiling of a tablet in Memorial Presbyterian Church, presented by National Railway Historical Society. 14 proc. l. Free on request to AAR BRE Library, Washington 6, D. C., as long as limited supply lasts. ". . . Henry M. Flagler was unique among the great railroad builders. He was a 'one-man corporation.' Out of his own pocket he financed the construction of the Florida East Coast Railway and many of his other enterprises. He was the only man in American history who initiated and carried to completion such an extensive development program out of his own personal fortune. . . . It is my good fortune to have been engaged from 1909 to 1914 on this most interesting construction project. . . ."

The Highland Railway Company and Its Constituents and Successors 1855-1955. 121 p. Illus. Map. London, W. 14, England, The Stephenson Locomotive Society, 32 Russel Road. 10 shillings net.

History of Freight Cars in This Country—Memorandum listing 22 books and articles on the subject, published 1832-1958, by A A R BRE Library Feb. 17, 1959. 4 proc. l. Free on request to Library, 1002 Transportation Bldg., Washington 6, D. C.

The Illustrated Story of the Railroads. [80] p. In The World Around Us series, New York 3, N. Y. Gilbertson Co., Inc. 25 cents. "... A Weapon of War" pp. [2-12] is picture history of Herman Haupt in charge of rebuilding and repairing railroads and bridges in Virginia in 1862, and of supply by trains, to the Union Army to and at Gettysburg battle, with removal of wounded, as well as organizing and training a railroad construction corps in 1863.

Industria International—The Year in Sweden 1958-1959. 180 p. Illus., part in color, Maps. Charts. Stockholm, Sweden, Swedish Employers' Confederation. No price given. In Lapland, helicopters for ambulance service; airlifts for reindeer to better feeding grounds, and reindeer herding by automobiles, pp. 10, 12. Timber transport overland by drum—"the cable crane has become obsolete" p. 26. . . . A third National Sweden-Norway Route was opened . . . this month. Official inauguration . . . in April . . . next year . . ." p. 28. Bombshelters and civilian evacuation, pp. 43-45, 120-126, include Civilian evacuation map, p. 43 and a bombshelter with "variety of peacetime uses shown" p. 44.

International carriage of Dangerous Goods by Rail—(RID) Regulations . . . in force from Jan. 1, 1959, by Ministry of Transport and Civil Aviation, Great Britain. For sale by H. M. Stationery Office. 10 shillings net.

Interstate Commerce Commission. 72nd Annual Report . . . fiscal year ended June 30, 1958. "To the Senate and House of Representatives." 188 p. incl. tables and charts. Washington 25, D. C., Superintendent of Documents, U. S. Govt. Print. Off. $1.25. "Highlights in Transportation During the Year" pp. 1-7. "Mobilization Planning for Defense" pp. 117-119. "Legislative Recommendations" pp. 135-144.

Japanese National Railways at a Glance. 58 p. Illus. Free on request to H. Saito, Director, Japanese National Rys. Foreign Dept., Kokutetsu Bldg., Marunouchi, Tokyo, Japan.

Last Train From Atlanta, by A. A. Hoehling. 558 p. Illus. New York 16, N. Y., Thomas Yoseloff, Publisher, 11 E. 36th St. $6.95. "... President Jefferson Davis asserted of Atlanta: 'Its fall would open the way for the Federal Army to the Gulf on the one hand, . . . It would give them control of our network of railways and thus paralyze our efforts . . .' What happened when such a juggernaut reached Atlanta is the subject of this documentary."

Law and Locomotives—The Impact of the Railroad on Wisconsin Law in the Nineteenth Century, by Robert S. Hunt. xiv, 292 p. Illus. Madison, Wisconsin, The State Historical Society of Wisconsin. $6.50.

[List of Railroads reporting piggyback—[T-O-F-C] loadings to Car Service Division. Feb. 12, 1959]. 1 proc. l. Free on request to

A A R Car Service Division, 321 Transportation Bldg., Washington 6, D. C. Changes since Feb. 12, noted in ink. CSD's weekly reports of loadings now summarized weekly on Market Outlook Page in Railway Age under caption "Piggyback Carloadings."

List of Railroads for Which There is Material [in] the Baker Library of the Harvard Business School. 9 proc. l. Available from Howard F. Bennett, Secretary, The Lexington Group. Northwestern University, Evanston, Ill., if a self-addressed envelope with 12 cents postage is enclosed with request.

Little Railways of the World, by Frederic Shaw. ix, 261 p., Illus., Maps. Berkeley 10, Calif., Howell-North Press, 1050 Parker St. $6.00. ". . . explanations for their being and fine descriptions of their locale."

Modern Railroad Data Processing—Step Toward the New Railroad Age. iv, 210 p. Washington 2, D. C., Railway Systems and Procedures Association, 357 Union Station. $5.00. Proceedings of 1958 Fall meeting.

The Monorail Potential, by Col. S. H. Bingham (Ret.). Address at annual meeting, Society of Automotive Engineers, Inc., Jan. 14, 1959, Detroit, Mich. 8 proc. l. Free on request to Col. Bingham, 109 E. 35th St., New York 16, N. Y.

Narrow Gage in the Rockies, by Lucius Beebe and Charles Clegg. 224 p.; photographs, equipment drawings for model makers, 3 colored paintings by Howard Fogg, and endpaper map by Frederic Shaw. Berkeley 10, Calif., Howell-North. $8.50.

Nationalisation—A Report . . . 68 p. London, W. 1, England, Federation of British Industries, 21 Tothill St. 5 shillings.

New Materials in the Area of Transportation Added to Baker Library. [iii], 17 proc. p. Free on request to Baker Library, Graduate School of Business Administration, Boston 63, Mass.

New Mexico's Royal Road—Trade and Travel on the Chihuahua Trail, by Max L. Moorhead. ix, 234 p. Illus. Norman, Oklahoma, Univ. of Oklahoma Press. $4.00.

New Shares for Old—The Boston and Maine Stock Modification, by Robert L. Masson with the assistance of Carolyn Stubbs. xvii, 398 p. Boston 63, Mass., Harvard Business School Division of Research. $4.50.

Northwestern University Transportation Center. A Report . . . for the fiscal year 1957-1958. 12 p., Illus. Free on request to Director of Information Services, Northwestern Univ., 1818 Hinman Ave., Evanston, Ill.

The Official Directory of Commercial Traffic Representatives with an appendix of Transportation Commissions and Organizations—1959 Edition. 210 p. New York 13, N. Y., Traffic Publishing Co., Inc., 100 Sixth Ave. $6.00.

100 Years of Railroad Cars, compiled and edited by Walter A. Lucas. 196 p. Illus., Diagrs. New York 7, N. Y., 30 Church St., Simmons-Boardman Publishing Corp. $8.50.

Our 49th State—An Adventure in Marketing. 25 p. Illus. New York 19, N. Y., Benton & Bowles, Inc. No price given.

Overseas Railways 1958 [in Australia and New Zealand, Near East, Far East, Africa, Europe, Americas including Caribbean area]. 124 p. Illus. Maps by continents and some individual railroads. Diagrs. London, S. W. 1, A Railway Gazette Publication, 33 Tothill St. 7 shillings, 6 pence.

Pacific Electric Railway—A Pictorial Album of Electric Railroading, compiled by Donald Duke. 63 p. Illus. Map. San Marino 9, Calif., Pacific Railway Journal, 2304 Melville Drive. $3.75.

The Pennsylvania Railroad in the Coming Year 1959—Special Report, Nov. 29, 1958. 6 p. New York 5, N. Y., Alkow & Co., Inc., 40 Exchange Pl. No price given.

A Picture History of U. S. Transportation—On Rails, Roads and Rivers, by Roderick Craib. 124 p. New York 7, N. Y., Simmons-Boardman Publishing Corp. $6.00.

"Piggyback"—The Public Interest, and National Defense, by Morris Forgash. Address to Traffic Managers Conference of Southern California, Dec. 4, 1959. 19 proc. l.

The Pittsburgh and Lake Erie Railroad, by John W. Barriger, president. 44 p., sketch, folded. Free on request to Mr. Barriger. His address to New York Society of Security Analysts, Dec. 19, 1958.

The Pittsburgh and Lake Erie—Scenes Along the Road [set of 25 colored postcards with description note on each]. Free on request to John W. Barriger, president, P. & L. E., Pittsburgh, Penna.

Progress in Prestressed Concrete Railroad Ties. 22 p. Illus. Reprinted from Concrete Products, April, May and July 1958 by Portland Cement Association, 33 West Grand Avenue, Chicago 10, Ill. Price not given.

Purdue University Engineering Experiment Station. Research Activities 1957-1958. 119 p. Illus. "Transportation Research" pp. 62-63, 69, 78, 84, 184. Lafayette, Indiana, The University. No price stated.

The Rail Commuter Problem—A Brief List of Some Recent Discussions, Nov. 2, 1958. 8 proc. l. Free on request to A A R. BRE Library, 1002 Transportation Bldg., Washington 6, D. C.

Railroad Transportation—A Statistical Record 1921-1957. ii, 39 p. Published December 1958. Free on request to A A R Bureau of Railway Economics, 1024 Transportation Bldg., Washington 6, D. C.

[*Railroads and Regulations in 1959—Open and Closed Shop in 1959—The Looper Case*], by Senator Barry Goldwater (Arizona) before The Traffic Club, Pittsburgh, Penna., Jan. 22, 1959. 15 proc. l. Free on request to Senator Goldwater, Senate Office Building, Washington 25, D. C.

Railroads of the Hour, by S. Kip Farrington, Jr. Introduction by Richard M. Nixon, Vice President, U. S. A. xvii, 333 p. Illus. by photographs by Richard H. Kindig. New York, Coward-McCann, Inc. $8.50.

Railway Magazine Miscellany 1897-1919, edited by Henry Maxwell. 214 p. Illus. London, England, Ruskin House, George Allen & Unwin Ltd., Museum St. 30 shillings net. ". . . The Railway Magazine has recently celebrated its Diamond Jubilee . . . To mark the occasion we are

publishing . . . a resumé of the period from the beginning of the Magazine in 1897 to the end of the Great War. . . ."

The Railway Museum, York, England. [26] p. Illus. London, N. W. 1, England, The British Transport Commission, 222 Marylebone Road. 1 shilling. "The background story of the exhibits by T. L. C. Rolt."

Recueil des Termes Concernant L'Emploi et L'Echange du Matériel Roulant—Tome I. Edited by Wydawnictwa Komunikacyjne, and published by Le Ministère des Communications de la République Populair de Pologne, Warsaw. For sale by Union Internationale des Chemins de Fer, Secrétariat Général, 10 Rue de Prony, Paris 17, France. $9.00. Terms in English, French, German, Italian, Polish and Russian.

Regulations for the Transportation of Dangerous Commodities by Rail, Effective March 1st, 1959, by Board of Transport Commissioners for Canada. 299p. Illus. Ottawa, Canada, Printer to the Queen's Most Excellent Majesty. No price given.

Report of Investigation by the Public Service Commission of the Financial Condition of the Railroads Operating in the State of New York. 62 p. Appendices. Albany, N. Y., Public Service Commission. $2.00. Dated Jan. 26, 1959.

Road Transport in Nigeria, by E. K. Hawkins. viii, 99 p. Map. London, E. C. 4, England. Oxford Univ. Press. $2.25.

The Role of the Interstate Commerce Commission in the Regulation of the Transportation Industry, by Rupert L. Murphy, Commissioner, Interstate Commerce Commission. Address to Transportation Conference, University of Alabama, Feb. 11, 1959. 38 proc. l. Free on request to Secretary's Office, Interstate Commerce Commission, Washington 25, D. C.

XVII International Railway Congress, Madrid, Spain, Sept. 30-Oct. 8, 1958. Daily Journal (7 issues), and the following available on request as long as supply lasts, from the host railway, Red Nacionál de los Ferrocarriles Españoles, Attn.: Sr. Don Jesús de Lasala, Santa Isabel 44, Madrid, Spain: *Railways in Spain 1848-1958.* 122 p. Illus., Maps; *Madrid Railway Connections.* 13 p. Illus., Maps; *Map of the Spanish Railways* (fold.); *Madrid and Its Vicinity,* by Afrodisio Aguado. 278 p. Illus. Maps; *Pennants, Postal cards* [of locomotives], and *Stamps* commemorating the Congress; *Trenes, No. 68—El Ferrocarril en Europa 1958,* and *Trenes No. 69—Red Nacional de los Ferrocarriles Españoles 1958.* Included in No. 69 is *The Railway and Philately—History, Centenaries and Congresses,* by Juan B. Cabrera. Illus. of stamps in color.

Six Great Railwaymen—Stephenson—Hudson—Denison—Huish—Stephen—Gresley, by Richard Hough. 200 p. Illus. Maps. London, W. C. 1, Hamish Hamilton, Ltd., 90 Great Russell St. $1.70.

Solar Energy—The Power Source of the Future—Where You Can Read About It—Solar Energy Library. [6] p. Illus. Phoenix, Arizona. The Association for Applied Solar Energy, 3424 Central Ave. Free on request.

The South Western Railway—Its Mechnical History and Background 1838-1922, by Hamilton Ellis. 256 p. Illus. London, England, Ruskin House, George Allen & Unwin Ltd. $4.80.

Southeastern Railroad Museum, Inc. [Organization, Operations proposed, and list of tracings it has for sale]. 39 proc. p. Hammond, Louisiana, The Museum, P. O. Box 970. Free on request.

T-O-F-C Loading As Reported to the Car Service Division—Association of American Railroads [by weeks, with corresponding weeks, 1959-1955]. 1 proc. l. Free on request to Car Service Division, A A R, 321 Transportation Bldg., Washington 6, D. C. See also in this list [List of railroads reporting piggyback . . .]

The Stewardess Nurse—The only routine part of the nurse's life on a train is the time table, by Geraldine M. Yanta. 1 p. Reprinted from The American Journal of Nursing, Dec. 1938 and inserted in The North Coaster (Northern Pacific Ry.), Nov.-Dec. 1958.

Tweetsie—The Blue Ridge Stemwinder, by Julian Scheer and Elizabeth McD. Black. x, 67 p. Illus. by Lee Kolbe. Charlotte 5, N. C., Heritage House, 5308 Monroe Road. $2.95. ". . . Tweetsie, officially the East Tennessee and Western North Carolina Railroad (ET&WNC), was the first railroad to cross the Blue Ridge."

Unusual Railways, by B. G. Wilson and John R. Day. 212 p. Illus. Diagrs. New York, The Macmillan Co. $4.50. Atmospheric, Cable-Worked, Concrete tracks, Funiculars, Guide Rail, Monorails, Overhead, Pneumatic Tyre, Rack and Similar, Ship, Some Other Systems.

The Urgent Six—"Of a score or more of major problems, here briefly are the ones railroads regard as most serious . . ." 19 p. Washington 6, D. C., Association of American Railroads, Transportation Bldg. Free on request.

What Increased Manufacturing Employment Means to Community Growth. 12 p. Montreal, Quebec, Canada. Canadian National Railways Research and Development Department. Free on request.

Year of Decision: Clear Track or Crisis? by Daniel P. Loomis, president, Association of American Railroads. Address to annual meeting, National Association of Shippers Advisory Boards, St. Louis, Mo., Feb. 11, 1959. Cover-title, 17 p. Washington 6, D. C., Association of American Railroads, Transportation Bldg. Free on request. ". . . Featherbedding by any definition is a net loss to all America . . ."

WORLD RAILWAYS 1958-1959. Fifth Edition—A World-Wide Survey of Railway Operation and Equipment, edited and compiled by Henry Sampson, xi, 358 p. Illus. Maps. 85 adv. p., part illus. in color. London, W. 1, Sampson Low's "World Railways" Ltd. 5 pounds, 5 shillings, net.

ARTICLES IN PERIODICALS

Age of Steam Nears Its Last Puff in S. C., by J. V. Nielsen, Jr. Charleston, S. C., News and Courier, Jan. 25, 1959. Illus. with photos by author of "Old Wood Burner Used Recently in Operations near Coosawhahatchie" and "One of Two Hampton & Branchville Coal Burners Laid Up at Miley."

The Alaska Railroad Tie Program, by Irvin P. Cook. Cross Tie Bulletin, Jan. 1959, pp. 11, 18.

All Change at Crewe for the New Era—Last of the Steam Locomotives, by Our Industrial Staff, Monday, Dec. 15, 1959. Manchester, England Guardian, December 16, 1959. "The last of the steam locomotives to be built at the Crewe Works of the London Midland Region of British Railways left the paint shop here today. . . ."

ATA 25th Silver Anniversary. "This issue . . . is devoted mainly to saluting the American Trucking Associations on the observance of 25 years of service to commercial motor transportation." Transport Topics, October 10, 1959. 210 p. Illus.

Articulated Locomotives of the Western Pacific, by Mark Noble. Additions by Guy L. Dunscomb and Donald Duke. Pacific Railway Journal, San Marino, Calif., January 1959, pp. 1-24. Illus., Map, Profile.

The Benelux Electric Trains, by W. J. Wyse. Railway World, London, England, December 1958, pp. 353-355. "The dual-voltage multiple-unit electric trains which operate a regular interval service between Belgium and Holland."

Big Boy . . . that's what an Alco workman chalked on the smoke box of the world's heaviest steam locomotive back in 1941, and no one has ever seen fit to dispute the name, by David P. Morgan. Trains, November, 1958. Illus. ". . . Big Boy has always been much more than just another locomotive, of course. The 4000's are a legend . . . certainly the biggest box-office star of any of the 3000 articulateds that have operated in the U. S. . . . Union Pacific has remained delighted with the reception granted its monsters. . . . It's nothing faked; it's something natural, obvious, inevitable, infectious . . . virtually everyone on UP's payroll is Big Boy conscious, Big Boy proud. . . . As of June 1958 17 were ready to roll in case traffic climbed and the long delayed newcomers, the 8500-horsepower gas turbine remained at General Electric. . . ."

Big Power Changes on the Way—Are the Railroads Prepared for Them? by Dr. Robert H. Smith. Railway Age, December 8, 1958, pp. 14-16, 22. Chart: *U. S. Energy Sources. 1955 and 1980,* p. 15 lists Coal, Liquid Petroleum, Wet Natural Gas, Hydro Power and Atomic Power.

C & N W Bi-Level Streamliners Are In Service. Railway Locomotives and Cars, November, 1958, pp. 32, 64. Illus.

Cleveland Firm, Remains of Van Sweringen Brothers Rail-Land Empire, Folds Today ". . . as a going concern," by Harlan Byrne. The Wall Street Journal, February 13, 1959, p. 22.

The Conquest of Space, by D. G. Edward Pendray. The Toronto Railway Club. Official Proceedings . . . October 27, 1958, pp. 11-35.

Curvy Railroad—Pacific Great Eastern, by Art Hanford, Illus. with photos by author. Locomotive Engineers Journal, November 1958, pp. 3-5.

Diesel Economics in the U. S. S. R. Diesel Railway Traction, December 1958, pp. 477-483. A study of values and factors applied to freight haulage, based on official statistics.

Diesel Traction Development in Spain—A 30-year history. Diesel Railway Traction, October 1958, pp. 377-382. Illus. Diagrs.

Disappearance of Rudolf Diesel in 1913 Still Is An Unsolved Mystery. Locomotive Engineers Journal, November 1958, p. 8. Illus.

An Early Construction Contract—Railway Engineering in 1818, by C. R. Clinker, president, Railway and Canal Historical Society. Modern Transport, October 4, 1958, p. 6.

EMD Introduces New Locomotives. Railway Locomotives and Cars, January 1959, pp. 18, 20, 22. Illus. Diagr. "Supercharged 567-D Diesel is used in 2,400-hp road switcher: 46 of these SD-24 units have been ordered."

The End of the Great Northern of Ireland, by N. N. Faulkner. Trains Illustrated, October 1958, pp. 516-522. Map.

"EUROP" [European Freight Car Pool]—*Works on the Railroads —"EUROFIMA"—Co-operative Finance Organization* [for purchase of cars and locomotives]—*Standardization.* 8 p. Illus. France Actuelle, June 1, 1958. ". . . Today, . . . 180,000—or almost one in five —carry the EUROP identification, and 60 per cent of the international rail freight traffic in Western Europe now moves on EUROP cars. . . ."

First International Piggyback Service Will Be Inaugurated March 23 by the Lackawanna and the Canadian National. ". . . New York-New Jersey and Toronto . . ." Railway Age, March 2, 1959, p. 7.

First Main Line A. C. Electrification in Britain—Initial Run [Nov. 26] with a Passenger Train over the Styal Line—Converted Gas-Turbine Locomotive . . . The Railway Gazette, December 5, 1958, pp. 676-677, 694. Illus.

First Wide Span Stressed Concrete Railway Bridge, by D. J. Dardis. Transport Age, British Transport Commission, pp. 16-21. Illus. Diagrs.

The Four Aces 4-8-4, by R. V. Nixon. Illus. showing history from April 1930-1958. Trains, November 1958, pp. 16-20.

The 4-8-4, by H. L. Kelso. Railroad Magazine, December 1958, pp. 18-25. Illus.

French National Railroad News, Vol. 1, No. 1, January-February 1959—6 p. Illus. New York 20, N. Y., French National Railroads, 610 Fifth Avenue. Miss Jean Hagin, editor.

Fuels and Injection Equipment for Traction Diesel Engines, by H. A. Gill and J. M. Smith. The Institution of Locomotive Engineers [Bulletin], Vol. 48, Part 3, 1958-1959. Illus. Diagrs.

The Honest Man [Peter Cooper]. American Heritage, February 1959, pp. 4-11, 104-106. Illus.

The Hydrogen Engine: Combustion Knock and the Related Flame Velocity, by R. O. King and others. Transactions of the Engineering Institute of Canada, December 1958, pp. 143-148. Diagrs. Tables.

I Deliver Diesels, by John F. McElhinney. Railroad Magazine, February 1959, pp. 18-21. Illus. "An Electro-Motive Field Man Tells About Shakedown Trips and How He Instructed Oldtime Steam Hoggers in Acquiring New Skill."

Institute of Transport Anniversary—Major-General G. N. Russell, C. B., C. B. E., M. Inst. T. In the chair at the anniversary luncheon [Nov. 11, 1958] . . . Modern Transport, November 15, 1958, pp. 1, 9. Port.

International Traffic—Where Do We Go from Here? by W. J. Wallace, director, International Div. The Express Messenger, December 1958, pp. 3-8.

Japanese Locomotives. Diesel Railway Traction, October 1958, p. 398. Illus. shows "740 b.h.p. 54-tonne diesel-hydraulic locomotive."

Last of the Choo-Choos [around Washington, D. C.] by A. L. Singleton. Washington, D. C., Sunday Star Magazine, March 1, 1959, pp. 10-12. Illus. shows St. Elizabeth's Hospital locomotive that hauls coal cars up a steep hill from siding to power plant.

The Lunacy of Railways, by Marjorie Whitelaw. East African Railways and Harbours Magazine, December 1958, pp. 401-407. Illus. ". . . Trevelyan, the historian, has called railways 'England's gift to the world' because it was here that engineers, by trial and error, first invented locomotives, found out how to lay track and operate a railway system and then, men of experience, went on to build railways over the world. . . ."

Maintenance of Railroad Motive Power Requires New Products and Materials, by John A. Welsch. Railway Materials, November-December 1958, pp. 4-8. Illus.

Management in Transport, by Major-General G. N. Russell. The Journal of the Institute of Transport, November 1958, pp. 3-9. Presidential Address, London, October 13, 1958. ". . . two clear divisions:—the science or theory of management, which might well be termed 'organisation,' and the art or practice of management—in other words 'leadership.' . . ."

Mansions on Rails. Railroad Magazine, February 1959, pp. 60-61. Illus. ". . . 49 packing-cases of collodian wet-plate negatives" that make an almost complete picture file of Pullman cars built in 19th Century. Found in a loft of a Pullman shop, it was turned over to Lucius Beebe. "The cream of the prints" will appear in Beebe's book "Mansions on Wheels: the Folklore of the Private Railway Car" to be published this fall by Howell North Press, Berkeley, Calif.

Masai moran (young warriors) are inquisitive when a new '85' class diesel-hydraulic locomotive arrives in their district. Color photograph. East African Railways and Harbours Magazine, December 1958, p. 417. Maroon, red, black, and gold distinguish this locomotive.

Metropolitan U. S. A.—1970. General Electric Review, September 1958, pp. 22-28. "Using Existing Rail Lines—Integrated Commuter Service" p. 27. Reprint free on question to G. E. Apparatus Sales Division, Schenectady, N. Y.

A New Approach to Mass Transportation. New York (State) Chamber of Commerce Monthly Bulletin, December 1958, pp. 292-298. ". . . Suggested is the creation of a [New York] City Transportation Authority. . . . a government corporation, created by the City to operate as a revenue facility, with the power to levy fares, tolls and other charges on the various facilities under its jurisdiction, and to issue its own bonds . . ."

New Dress for SP diesels: Red and Gray. Railway Age, March 2, 1959, p. 9.

New German Locomotive Types—Projected standard types of 1,100 to 3,600 b.h.p. being built in prototype batches "... in collaboration with various German builders . . ." Illus. shows "64-tonne, 1,100 b.h.p. general-purpose diesel-hydraulic B*B locomotive of class V.100 . . ."

New Haven Electrics, by Sy. Reich. Railroad Magazine, April 1959, pp. 48, 50, 52, 54. "Our next article will tell what happened when the New Haven took up diesel power."

New York's Jet Age Future, by C. R. Smith. New York (State) Chamber of Commerce Monthly Bulletin, October 1958, pp. 134-141.

Nuclear Radiation Safety, by Edward J. Kehoe. New England Railroad Club, Official Proceedings, November 12, 1958, pp. 86-90.

Nursery Class, 0-2-0-2-0 Locomotive. East African Railway and Harbours Magazine, December 1958, p. 420. Illus. and Technical Data. "One locomotive of this class, designed and built by a member of the E. A. R. & H. staff, was placed in service by Santa Claus on the 25th December, 1957 . . . it is still a very firm favorite with its present operating staff." "Gauge 2¾"; "Working Pressure—Very High"; "Adhesion Weight—3.001255 lb. or thereabouts"; "Tractive Effort—Amazing Down Hill."

ORE Locomotives and Engines. Diesel Railway Traction, October 1958, pp. 369-370. "For some six years now ORE has been at work on the subject of European standard diesel locomotives. . . . But since last July the proposals of ORE for admitting any other engine into the 'accepted European standard' class are so fantastic that they should be simply laughed out of court. They seem, indeed, to be designed to exclude all types not now accepted and to admit of no further progress. Standardisation is to be stagnation. . . ."

Problems of the German Federal Railway, by Ernest Davies. The Railway Gazette, January 16, 1959, pp. 68-70.

Railroad In A Barn—Snowshed crews on the Central Pacific, battling blizzards and snowslides, built 'the longest house in the world,' by Fitzhugh Turner, American Heritage, December 1958, pp. 52-57, 107, 109. Illus.

The Railroads' Big Scare, by A. E. Lyon. American Federationist, December 1958, pp. 3-5.

Rails for Logging . . . Oregon & Eureka, by Stanley T. Borden. Western Railroader, November 1958, pp. 2-18. Illus. Map.

Railways in America—I. The Fight Against Decline. II. Prospect Ahead Brighter, by William White, president D&H RR Corp. London, England, Times, December 9, 1958, p. 11; 10, 1958, p. 11.

Red China Spurs Sinkiang Growth—Ten-Year Industrialization Plan Revealed—Railroad to Russia is Key, by Tillman Durdin. New York Times, October 16, 1958, pp. 1, 8. Map. Dispatch dated Hong Kong, Oct. 15. ". . . The 1,800-mile railway . . . will be completed next year. The line will permit through rail traffic from ports on the Yellow Sea, 3,000 miles from Urumchi. . . . the third rail link between China and the Soviet Union. The two others are the old Trans-Siberian connection in Manchuria and the Trans-Mongolian railroad, opened in 1955. . . ."

The Right Way, Central of Georgia Magazine. Historical Issue—125th Anniversary 1833-1958. 28 p. Illus.

Role of Private Enterprise, by Norris R. Crump, president CPR. Modern Transport, November 15, 1958, p. 12. Address at anniversary luncheon of the Institute of Transport, November 11. Ed. comment: Canada's Example, p. 1.

Royal Luxury of Ninety Years Ago: Queen Victoria's Railway Saloon. The Illustrated London News, February 7, 1959, p. 221. Illus. Constructed in 1869, it was brought from its temporary store at Wolverton, Bucks to the Furniture Exhibition at Earls Court in Jan. and Feb. Day-Room, the Queen's Bedroom, the Queen's Dresser's Room and a washing compartment, are shown.

. . . *Santa Claus Disaster of 1895* [on Uganda Ry.] East African Railways and Harbours Magazine, December 1958, front cover picture "an artist's impression" and inside front cover. ". . . the Great Santa Claus Disaster . . . which took place on the Simba Sana branch line at mile 1104 when the general manager of a firm of Christmas fancy goods retailers was eaten by savage lions, the lions lay down on the roadway to sleep it off, bringing the 9 Down Mixed to a halt. A spear thrown by a tribesman roused the lions, and Driver Porridge, with the track clear drove the train to mile 1103. "Artist's impression" and the explanation are railroad cartoon collectors' items.

Scenery, Streamliners and Steam—From Toronto $100 will purchase a circle trip around Lakes Huron and Michigan that mixes Canadian bush country with U. S.'s newest passenger train, an interurban and 4-8-2s, by Jim Scribbins, Tripmaster. Trains, March 1959, pp. 23-26. Map and Illus.

Seaway Spending—Federal, Private Units Step Up Channel, Port Work As Opening Nears—Projects Total $425 Million. . . . , by Ray Vicker. The Wall Street Journal, March 3, 1959, pp. 1, 14 including Map.

Some of the Economics of Railroading As I See Them, by Ben W. Heineman, chairman, C&NW. The Western Railway Club, Chicago. Official Proceedings, October 6, 1958, pp. 10-16.

Sonderheft DIESEL-SCHIENENFAHRZEUGE. Die Bundesbahn, Darmstadt, Germany, December 1958, pp. 1192-1325. Illus. Diagrs., Maps, etc.

SP Narrow-Gage, by Freeman Hubbard. Railroad Magazine, February 1959, pp. 26-29. Illus. Keeler-Laws branch in the Owens Valley of southeastern California . . . hauls only freight, mostly mining products outbound. "America's only narrow-gage diesel locomotive, Southern Pacific No. 1 . . . has been doing nearly all of the freight work . . . since October 1, 1954"—photograph p. 27.

SP's Atoms Measure Diesel Wear—Radioactive Tracer Techniques . . . Replace the Previous Costly and Time-Consuming Measuring Methods . . . Railway Age, March 2, 1959, p. 16. Illus.

Soviet Railway Developments—Electrification Progress. Modern Transport, October 25, 1958, pp. 5, 12. Illus. Map.

The Story of 4-6-4 Locomotives, by H. L. Kelso. Railroad Magazine, April 1959, pp. 22-29. Illus.

Tracks Ahead, January-February 1959. Vol. 22, No. 1. Published by Union Pacific Department of Traffic, Livestock & Agriculture, Omaha, Nebraska. Formerly known as *Traf-Fact.*

Transcendental Aspects of Business, by Arthur H. Cole. Harvard Business Review, September-October 1958, pp. 31-36.

The Transportation Act of 1958, by Daniel P. Loomis. The Analysts Journal, November 1958, pp. 57-61.

Transportation Literature 1958, compiled by Kanardy L. Taylor, chief librarian, Transportation Center, Northwestern University, Evanston, Ill. Special Libraries, February 1959, pp. 64-71.

Type "2" Co-Bo Diesel-Electric Locomotives for British Railways—Five-axle five-motor design with two-strike engine, for mixed traffic duties. The Railway Gazette, November 14, 1958, pp. 594-596, 599. Illus. Diagrs. Tables. "The first of 20 . . . ordered from Metropolitan-Vickers Electrical Co. Ltd. and numbered D5700 was delivered . . . at the end of July, 1958. . . ." Ed. comment p. 587, mentions: "By introducing the 1,200-h.p. Type "2" . . . British Railways have departed from their established practice of placing in service conventional diesel engines of exclusively the four-stroke type for locomotives designed for mixed-traffic duties. . . ."

Unsnarling Traffic on the Roads, Rails, and Airways, by John R. Snyder, Jr. Harper's Magazine, November 1958, pp. 31-36.

URR News, Vol. 1, No. 1, January 1959—4 p. Published for the Employees of the Union Railway Company, Pittsburgh 30, Penna.

Weep No More My Lady—Tribute to an unforgettable Pacific from the Bluegrass country, written by a man who fell in love at first sight, David Morgan. Trains, March 1959, pp. 20-22. Illustrations show L & N's 295 from 1925-1952.

New Books

Unusual Railways, by B. G. Wilson and J. R. Day. 212 pages, 8½x5½, illustrated. Published by The Macmillan Co., 60 Fifth Ave., New York (11), N. Y. Price $4.50.

The authors have presented an interesting account of the different types, both present and past, both steam driven as well as by other means under this classification. Commencing with the ship railroad across the Isthmus of Tehuantepec, through our own cog railroad up Mt. Washington, N. H., and the many other railways based on this principle to the monorail that is being demonstrated at Houston, Texas, the book is replete with information about these "unusual railways." One of the most interesting experiments, at least to this reviewer, was the atmospheric railway at South Devon, England. Here, by means of a cast-iron tube, 15″ diameter, laid between the rails, by exhausting the air every three miles by means of pumping stations, the vacuum thus made would draw the car along the rails. The atmospheric principle had the backing of the leading scientists as well as I. K. Brunel of Great Western Ry. fame but the long leather flap which was used to seal the valve in the slot in the top of the 15″ pipe not only dried out because of the weather but served as a delightful repast for the rats of the countryside and the idea was abandoned.

Another interesting little road was the 9½ mile Listowel & Ballybunion Ry. in Ireland. This was a monorail, the equipment straddled the rail which was built on an elevation. By means of careful loading, a balance was maintained but, one day the road was called upon to transport a cow. Now, one cow would throw the car off balance so, another one was borrowed and the train started off for the end of the line. Upon arrival, in order to get the "borrowed" cow back to its owner, the same problem was presented. However, this stationmaster was a bit smarter and he borrowed two calves to offset the weight of the cow and they were finally returned, one on each side of the vehicle.

Altho' there is a wealth of detail describing these different railways, it is presented in such a fashion as to be neither tedious nor tiresome to the reader that may not be mechanically inclined. You do know the principle upon which these different railways used their power and the rack railways in Switerland are of especial interest.

The authors have done well in the collection and the presentation of this material. So many times information about either these railways or this method of propulsion has been called for and it has meant a long and difficult search through the different mechanical journals. Now it has been collected in one volume. Some of these systems have been the means of scaling summits where no ordinary railroad could ever have ascended yet the safety devices have far exceeded those on our regular lines. It has been interesting to learn what the human mind has devised. Because of its subject, the book is of more than passing interest and is a worthy addition to any rail fan's library.

Then Came the Railroads, by Ira G. Clark. 336 pages, 9x6, illustrated. Published by the University of Oklahoma Press, Norman, Oklahoma. Price $5.75.

This is a story of our Southwest from the time the railroads first penetrated those states to the present and perhaps it emphasizes in no other way the fact that it was the penetration of the railroads into that section, more than anything else at that time, that resulted in the growth of such states as Missouri, Kansas, Arkansas, Oklahoma and Texas.

The Indians, the land and even the elements were hostile to the railroad builders and, even after the railroads were built, their managements had to encourage the settlers to remain on their farms. It was during the drouth-ridden, grasshopper-plagued year of 1874, with the crops wiped out and the hopes of many in Kansas were at a low ebb. To those that wished to leave that state, the railroads offered free transportation. The Santa Fe, in connection with the Kansas Relief Commission, transported free of charge 5000 tons of food and clothing donated throughout the nation to the sufferers and brought in grain and coal at rates that covered only the actual cost of handling. It granted a moratorium to the purchasers of railroad lands and bought 100,000 bushels of seed wheat that was distributed to the settlers on both railroad and government lands, taking unsecured notes in exchange.

It is only too true that the settlers and the railroads did not see "eye to eye" but, when faced with overwhelming odds, they worked together. The formation of the Interstate Commerce Commission was the means of checking some of these abuses, but, with the settlement of the differences of the railroads between themselves, then the great Southwest, with its oil, cattle and wheat, all vital necssities in a modern world, became a most important factor of our country.

The author has not burdened the reader with too many lengthy details of the growth of these railroads of the Southwest. There were a few scattered roads in this section prior to the Civil War. It was at the close of that conflict that construction started in earnest and we can't help but feel that the Indians received rather shabby treatment at the hands of the "Great White Father" as well as others in order that their lands could be crossed to reach into Texas. Just how this problem could have been worked out, it is difficult to say.

The book has presented an interesting account of the railroads and the growth of our great Southwest and I'm sure that the majority of our members will be interested in this acount of the growth of this section of our country.

This Was Railroading, by George B. Abdill. 192 pages, 10½x8, illustrated. Published by the Superior Publishing Co., 2809 Third Ave., Seattle (11), Washington. Price $10.00.

Not too many works have appeared on the larger railroads that traverse our northwestern states and even less has appeared on the smaller railroads of that section. This is the task that the author has taken upon himself and he has handled it in a delightful manner and told it as a railroad man should. The author is a locomotive engineer on the Southern Pacific.

The railroads in this section had their inception in the portage railroads as early as 1851 and from that time, there was a steady increase in the construction of small roads, some of which were consolidated into the larger systems such as the Northern Pacific, Great Northern or the Milwaukee Roads, to the many industrial lines, such as the logging roads that were built to haul out the timber. The author's account of these railroads is not too detailed to be tiresome but is ample to cover the subject and whet the reader's interest. A chapter even includes the White Pass & Yukon; Alaska and the Seward Peninsula R. Rs.

But the most interesting feature of this book are the illustrations. Thanks to the assistance of our own members such as Fred Jukes, H. H. Arey, E. D. Culp and others; the Oregon Historical Society and other groups these, together with the prints from the collection of the author have made a display of interesting photographs that is seldom equalled. One might well ask where the author has been all these years and, I suppose the answer might be that in addition to his railroad duties he has been acquiring this material. Thanks to the engraving, the printing and the paper stock, none of the interesting details are lost. If one photograph is worth a thousand words of description, then the "wordage" in this book would approach astronomical figures. A book such as this is published once every so often and not very often.

No matter what one's special interests are, if they cover the railroad field, a book such as this should be in his library. The statement that the book is "An Historical Collection of Rare Photos" is no exaggeration —it is unbelievable. The author and publisher deserved special commendation.

The Manawatu Line, by T. A. McGavin. 38 pages, 9x6, illustrated. Published by The New Zealand Railway & Locomotive Society, P. O. Box 5134, Wellington, C. 1., New Zealand. Price 75c.

> "It was quite a railroad, the Manawatu Line. The first general manager was a Lambton Quay grocer, and the directorate included several merchants, a lawyer or two, a brewer, at least two retail drapers, and a pioneer settler whom Seddon once described as the 'Father of Wellington.' But these amateurs not only built a railway. They also ran it for twenty-two years, and ran it well."

Such is your introduction to this interesting 3′ 6″ gauge, 84 mile railroad connecting Wellington with Longburn on the North Island of New Zealand. It was not an easily constructed line but the grocer, the merchant and draper were persistent and the last spike was driven on November 3rd, 1886 and, it was the hope of the incorporators that the New Zealand Government would purchase the railroad. This was not to be, at that time and for twenty-two years the railroad was well managed by local talent but, on December 7th, 1908, the New Zealand Government exercised its rights and purchased the line and it is now part of the New Zealand Railways.

To this reviewer two things stand out in this little line. The first is the fact that it was built and managed with local capital and men and, they appear to have done a first class job. The second is that its

motive power and rolling stock came from this country—whether the English firms were unable to furnish it when needed, the author does not disclose. True, the first five engines came from Manning Wardle & Co. of Leeds in 1884 and were of the 2-6-2T type and these were followed by three of the 2-6-2 type from Nasmyth Wilson & Co., Manchester in 1885. The rest of the motive power, fourteen in all, were built by our own Baldwin Works from 1888-1904 and were made up of 2-6-2, 2-8-0, 2-8-2, 2-8-4T and 4-6-0 types. The majority of these Baldwin engines were Vauclain compounds and they appear to have turned in a fine performance. Nos. 19 and 20 were two graceful, high-stepping ten-wheelers built in 1904 and they were certainly a credit to their builders not only in performance but in appearance.

This booklet is richly illustrated with locomotives, railway scenes, maps, profiles, timetables and is certainly a credit to its publishers. It is also one that I believe will be of interest to many of our members—a small well managed railroad with American built rolling stock on the North Island of New Zealand, away down under.

Little Railways of the World, by Frederic Shaw. 261 pages, 9½x6½, illustrated. Published by Howell-North Co., 1050 Parker St., Berkeley (10), California. Price $6.00.

This is a story of bantam, work-a-day railroads found throughout the world. We visit the Romney, Hythe & Dymchurch Light Ry., the Otavi Mining Ry. in Africa, our own Edaville R. R., the Festiniog, the Talyllyn, the Wabash, Frisco & Pacific and the Darjeeling-Himalayan Ry. of India along with several others. The book is richly illustrated and includes drawings of many of the locomotives that served these railways, maps and timetables.

The author has given the reason for the creation of these little lines and has recounted their construction as well as their operation. One cannot but help admire the spirit of the British in their coming to the rescue of their own R. H. & D. Light Ry. and the Talyllyn Ry. in preventing their destruction. Despite their slender resources but with plenty of hard work and energy, these two little lines have been preserved for posterity. The average American "fan" might well ponder why something of the sort was not done in this country when many of our small lines were destroyed. This reviewer knows only of one instance in this country.

These little lines have their place in the affairs of the railway world and the author has done a distinct service in collecting this material and presenting it in such interesting form and with a wealth of detail. It is a new and interesting field—one of unusual interest.

The British Railway Locomotive—1803-1853, by G. F. Westcott. 32 pages, 6½x8½, illustrated. Published for the Science Museum by Her Majesty's Stationery Office. Copies may be obtained from same at York House, Kingsway, London, W. C. 2, England. Price 25c.

This is an interesting picture book of the famous British locomotives of the fifty years of the subject matter. The illustrations appear in chronological order and are fully described, separately by four pages of

text. This permits larger and better illustrations. In addition, Stephenson's "North Star" of 1837 appears in colors as a frontispiece. There are also seven pages of text describing conditions and other early locomotives. It is of more than passing interest to note that carriages of the wealthy were carried on flat cars with their passengers as early as 1829.

To those that are interested in the development of the steam locomotive, this booklet is of unusual interest and value. The illustrations are exceptionally good and clear, of a size to make the details stand out and the accompanying text is of sufficient interest and value to greatly add to the illustrations.

The Kuhler Prints—picture size 12x15", paper size 19x23". Price $7.00 each. Copies may be obtained from Mr. Otto Kuhler, K-Z Ranch, Pine, Colorado.

The author of these prints should need no introduction to our membership as his work has appeared on the cover design for our Bulletin for many years. Their accuracy for details cannot be questioned. Two prints are now ready for distribution—"South Park Doubleheader Inching over Fremont Pass" and "Chow Stop at Como," also on the South Park Line. Both are in authentic colors and both belong in the class of Currier & Ives prints published many years ago. Another lithograph can be looked forward to during this year.

These prints have met with wide reception not only in this country but abroad and they will make a wonderful addition to your den. Now is the time to obtain your copy before the supply is exhausted.

Law and Locomotives, by Robert S. Hunt. 292 pages, 9x6, illustrated. Published by The State Historical Society of Wisconsin, 816 State St., Madison (6), Wisconsin. Price $6.50.

Not too much has been written on the legal history of the United States. The building and the operation of our railroads created new legal problems. Our agencies of the law, the legislature, courts and the executive, all attempted to deal with this problem in a raw, new state—Wisconsin.

Here is bared the scandal of the La Crosse & Milwaukee R. R. under the guidance of Byron Kilbourn that bribed an entire legislature, a governor and a justice of the Supreme Court of Wisconsin. The author describes why the legal structure broke down and yielded so readily to the inducements of Kilbourn and others. Farmers eagerly mortgaged their farms to help finance these railroads and, a few years later, stood a fair chance of losing them.

There was always a struggle between the state and the railroads and it was not until chief justice Edward George Ryan saved the day by declaring that the state had a more legitimate claim to authority than the corporations it created. Chief Justice Ryan was a tower of strength during these troublesome times.

With legislators willing to enact laws but failing to provide the necessary "teeth"; governors, the majority of whom were indifferent to the need of corrective legislation—it remained for the courts to build

up a series of decisions that would protect the citizen. The formation of the Interstate Commerce Commission in 1887 was a step in the right direction, so was the creation of the State Commission, greatly strengthened under Governor Robert M. LaFollette, but for four decades, matters were somewhat chaotic.

The book should appeal to the jurist and the lawyer, the historian and the political scientist for it shows that our laws have not kept up with the rush of events.

The Grand Trunk Railway of Canada, by A. W. Currie. 556 pages, 9x6. Published by the University of Toronto Press, Toronto (5), Ontario, Canada. Price $8.50.

The Grand Trunk Ry. was incorporated November 10th, 1852, to build a railway connecting the cities of Montreal and Toronto. It soon acquired the railroads connecting Montreal with Portland, Maine as well as the Quebec & Richmond which brought the railroad into Quebec. It extended its own line to Sarnia, acquired the Great Western Ry. which brought it to Windsor and, with the construction of the Canadian Pacific Ry., it hastily acquired certain short lines to prevent their falling into "alien" hands. The G. T. R. might have been better off if they had. By means of the Grand Trunk Pacific, the system was expanded to reach Prince Rupert, B. C., and, with its credit well nigh exhausted and facing the traffic generated by World War I and its consequent rise in prices, the system was on the verge of bankruptcy. It is now, as we all know, a part of the Canadian National Railways.

Practically all of the stock and bond holders resided in England tho' no one can fail to appreciate the financial assistance rendered by the Canadian provinces and later the Dominion government. But, it can be truthfully stated that dividends were sometimes paid when the money should have been ploughed back into the system, that the accounts were juggled, that there was a large amount of "water" in the stock and the railroad was notorious for its poor management, save in one instance. Absentee management has never been a success!

It was while Sir Charles Rivers-Wilson was President, 1895-1905 and Charles M. Hays was Vice President and President, 1896-1912 that the railroad was properly managed. Mr. Hays came from the Wabash, introduced American methods of operation, practically rebuilt the railway and fathered the extensions during those years. He lost his life in the sinking of the steamship "Titanic."

It was under his management the road was again extended into the eastern seaboard and a few words from this reviewer may not come amiss. Early in the twentieth century, the Canadian Pacific Ry. caused a survey to be made from Montreal to New York City. The two American railroads most seriously affected—the Delaware & Hudson and New York Central undoubtedly made concessions to the C. P. R. if they would not build. To have allowed the G. T. R. trackage rights over their railroads would have caused the C. P. R. to commence construction. The New York, Ontario & Western, under New Haven domination at that time would naturally refuse and, the road had only trackage rights over the N. Y. C. into Weehauken.

The New England situation was a bit different. The Central Vermont never touched Concord, N. H. as stated by the author. At White River Jct., Vt., it turns south to Windsor, Vt., uses the B & M to Brattleboro and proceeds to New London. Thus, the C. V. was open to retaliation because of these trackage rights. The construction of a line to Providence, R. I., at that time and it still is the largest city in this country served by only one railroad was brilliant strategy on the part of Mr. Hays. Providence was a large industrial city originating much traffic and was a large center in southern New England. The death of Mr. Hays stopped work on this extension as the new President, Mr. E. J. Chamberlin may have heeded the sharp criticism against diverting traffic from Canadian to American ports. A final word—it has been the bitter rivalry between the two Canadian railroads that has killed the passenger service between Boston and Montreal. None of the three railroads involved can or will give good service, such as we had prior to World War I or during the "bootleg era" with the result that the air lines that make the trip in about an hour are getting all the passengers.

The Grand Trunk Railway at one time was the largest and the most important industry in Canada and the author has done a fine piece of research and has presented it in an interesting and intelligent fashion. Granted that the road was subject to competition from the river steamers and by the American railroads and that Portland, Maine, was not a satisfactory terminal but, if the road had only been wisely managed both in Canada and from England, it might have been one of the powerful railroads on this continent. Its potentialities were shown under the able management of both Messrs. Wilson and Hays. One trouble was that Canada was overexpanding its railroads early in this century. This history has been long overdue and is well worth our attention and interest.

The attention of our members is called to "The Phantom Brakeman," by our member, Freeman Hubbard, Editor of Railroad Magaine, published by the Arrow Book Club, 33 West 42nd Street, New York (36), N. Y. It is a pocketbook collection of railroad fact-stories and can be purchased from the publishers for 30c or at your bookstore for 25c.

In Memory of

JOHN H. CHAPLIN
Annual Member
Hartford, Connecticut
Who Died on August 15, 1958

W. M. CURTIS
Annual Member
283 Avenue C, New York (9), N. Y.
Who Died on November 1, 1958

HARRY HARVEY
Annual Member
7639 Perry Ave., Chicago (20), Ill.
Who Died on October 23, 1958

PAUL L. HENCHEY
Annual Member
63 Lapidge St., San Francisco (10), Calif.
Who Died in November, 1957

L. G. MORPHY
Annual Member
1332 Lakeland Ave., Lakewood (7), Ohio
Who Died on October 26, 1958

LEONARD F. WHIDDEN
Annual Member
87 East St., Melrose (76), Massachusetts
Who Died on February 1, 1959